DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AH02

Endangered and Threatened Wildlife and Plants; Designations of Critical Habitat for Plant Species From the Island of Hawaii, Hawaii

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule concerning designation of critical habitat.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), propose critical habitat for 47 of the 58 plant species known historically from the island of Hawaii that are listed under the Endangered Species Act of 1973, as amended.

Critical habitat is not proposed for seven species as they no longer occur on the island of Hawaii, and we are unable to identify any habitat essential to their conservation on the island. Critical habitat is not proposed for two species of loulu palm, *Pritchardia affinis* and *Pritchardia schattaueri,* for which we determine that critical habitat designation is not prudent because it would likely increase the threats from vandalism or collection of these species on the island of Hawaii. Critical habitat is not proposed for two species, *Cyanea copelandii* ssp. *copelandii* and *Ochrosia kilaueaensis,* because they have not been seen recently in the wild and no viable genetic material is known to exist.

We propose critical habitat designations for 47 species within 28 critical habitat units totaling approximately 176,968 hectares (ha) (437,285 acres (ac)) on the island of Hawaii.

If this proposal is made final, section 7 of the Act requires Federal agencies to ensure that actions they carry out, fund, or authorize do not destroy or adversely modify critical habitat to the extent that the action appreciably diminishes the value of the critical habitat for the survival and recovery of the species. Section 4 of the Act requires us to consider economic and other relevant impacts of specifying any particular area as critical habitat.

We solicit data and comments from the public on all aspects of this proposal, including data on the economic and other impacts of the designations, and the reasons why critical habitat for any of these species is prudent or not prudent. We may revise or further refine this rule, including critical habitat boundaries, prior to final designation based on habitat and plant surveys, public comment on the proposed critical habitat rule, and new scientific and commercial information.

DATES: We will accept comments until July 29, 2002. Public hearing requests must be received by July 12, 2002.

ADDRESSES: If you wish to comment, you may submit your comments and materials concerning this proposal by any one of the following methods:

You may submit written comments and information to the Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Office, 300 Ala Moana Blvd., Room 3–122, P.O. Box 50088, Honolulu, HI 96850–0001.

You may hand-deliver written comments to our Pacific Islands Office at the address given above.

You may send comments by electronic mail (e-mail) to: *FW1PIE_Hawaii_Island_Crithab@r1.fws.gov.* See the *Public Comments Solicited* section in **SUPPLEMENTARY INFORMATION** below for file format and other information about electronic filing.

You may view comments and materials received, as well as supporting documentation used in the preparation of this proposed rule, by appointment, during normal business hours at the above address.

FOR FURTHER INFORMATION CONTACT: Paul Henson, Field Supervisor, Pacific Islands Office (*see* **ADDRESSES** section) (telephone 808/541–3441; facsimile 808/541–3470).

SUPPLEMENTARY INFORMATION:

Background

In the Lists of Endangered and Threatened Plants (50 FR 17.12), there are 58 plant species that, at the time of listing, were reported from the island of Hawaii (Table 1). Twenty-seven of these species are endemic to the island of Hawaii, while 31 species are reported from 1 or more other islands, as well as the island of Hawaii.

TABLE 1.—SUMMARY OF ISLAND DISTRIBUTION OF 58 SPECIES FROM HAWAII

Species	Island distribution						
	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii	NW Hawaiian Islands, Kahoolawe, Niihau
Achyranthes mutica (NCN)	H					C	
Adenophorus periens (pendent kihi fern).	C	H	C	R	R	C	
Argyroxiphium kauense (Mauna Loa silversword).						C	
Asplenium fragile var. *insulare* (NCN).					H	C	
Bonamia menziesii (NCN)	C	C	H	C	C	C	
Cenchrus agrimonioides (kamanomano).		C		H	C	R	NW Islands (H)
Clermontia drepanomorpha (oha wai).						C	
Clermontia lindseyana (oha wai).					C	C	
Clermontia peleana (oha wai)					H	H	
Clermontia pyrularia (oha wai)						C	
Colubrina oppositifolia (kauila)		C			C	C	
Ctenitis squamigera (pauoa)	H	C	C	C	C	H	
Cyanea copelandii ssp. *copelandii* (haha).						H	

TABLE 1.—SUMMARY OF ISLAND DISTRIBUTION OF 58 SPECIES FROM HAWAII—Continued

Species	Island distribution						
	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii	NW Hawaiian Islands, Kahoolawe, Niihau
Cyanea hamatiflora ssp. *carlsonii* (haha).						C	
Cyanea platyphylla (haha)						C	
Cyanea shipmanii (haha)						C	
Cyanea stictophylla (haha)						C	
Cyrtandra giffardii (haiwale)						C	
Cyrtandra tintinnabula (haiwale).						C	
Delissea undulata (NCN)	C				H	C	
Diellia erecta (NCN)	H	C	C	H	C	C	
Flueggea neowawraea (mehamehame).	C	C	H		C	C	
Gouania vitifolia (NCN)		C			H	C	
Hedyotis cookiana (awiwi)	C	H	H			H	
Hedyotis coriacea (kioele)		H			C	C	
Hibiscadelphus giffardianus (hau kuahiwi)*.						H	
Hibiscadelphus hualalaiensis (hau kuahiwi)*.						H	
Hibiscus brackenridgei (mao hau hele).	H	C	H	C	C	C	Ka (R)
Ischaemum byrone (Hilo ischaemum).	R	H	C		C	C	
Isodendrion hosakae (aupaka)						C	
Isodendrion pyrifolium (wahine noho kula).		H	H	H	H	C	Ni (H)
Mariscus fauriei (NCN)			C	H		C	
Mariscus pennatiformis (NCN)	H	H			C	H	NW (C)
Melicope zahlbruckneri (alani)						C	
Neraudia ovata (NCN)						C	
Nothocestrum breviflorum (aiea).						C	
Ochrosia kilaueaensis (holei)						H	
Phlegmariurus mannii (wawaeiole).	H				C	H	
Phyllostegia parviflora (NCN)		C			H	H	
Phyllostegia racemosa (NCN)						C	
Phyllostegia velutina (NCN)						C	
Phyllostegia warshaueri (NCN)						C	
Plantago hawaiensis (laukahi kuahiwi).						C	
Plantago princeps (laukahi kuahiwi).	C	C	C		C	H	
Pleomele hawaiiensis (halapepe).						C	
Portulaca sclerocarpa (poe)				C		C	
Pritchardia affinis (loulu)						C	
Pritchardia schattaueri (loulu)						C	
Sesbania tomentosa (ohai)	C	C	C	H	C	C	NW, Ka, Ni (H)
Sicyos alba (anunu)						C	
Silene hawaiiensis (NCN)						C	
Silene lanceolata (NCN)	H	C	C	H		C	
Solanum incompletum (popolo ku mai).	H		H	H	H	C	
Spermolepis hawaiiensis (NCN).	C	C	C	C	C	C	
Tetramolopium arenarium (NCN).					H	C	
Vigna o-wahuensis (NCN)		H	C	C	C	C	Ni (H), Ka (C)
Zanthoxylum dipetalum var. *tomentosum* (ae).						C	
Zanthoxylum hawaiiense (ae)	C		C	H	C	C	

KEY
C (Current)—population last observed within the past 30 years
H (Historical)—wild population not seen for more than 30 years
R (Reported)—reported from undocumented observations
NW—NW Hawaiian Islands

Ka—Kahoolawe
Ni—Niihau
NCN—no common name
* Taxon only known in cultivation

In previously published proposals we proposed that critical habitat was prudent for 31 (*Achyranthes mutica, Adenophorus periens, Asplenium fragile* var. *insulare, Bonamia menziesii, Cenchrus agrimonioides, Clermontia lindseyana, Clermontia peleana, Colubrina oppositifolia, Ctenitis squamigera, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis cookiana, Hedyotis coriacea, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion pyrifolium, Mariscus fauriei, Mariscus pennatiformis, Phlegmariurus mannii, Phyllostegia parviflora, Plantago princeps, Portulaca sclerocarpa, Sesbania tomentosa, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis*, and *Zanthoxylum hawaiiense*) of the 58 species reported from the island of Hawaii. No change is made to the 31 proposed prudency determinations in this proposal and they are hereby incorporated in this proposal (65 FR 66808, 65 FR 79192, 65 FR 82086, 65 FR 83158, 67 FR 3940, 67 FR 9806, 67 FR 15856, 67 FR 16492).

In this proposal, we determine that critical habitat is prudent for 23 species (*Argyroxiphium kauense, Clermontia drepanomorpha, Clermontia pyrularia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Isodendrion hosakae, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Sicyos alba, Silene hawaiiensis*, and *Zanthoxylum dipetalum* var. *tomentosum*), for which prudency determinations have not been made previously, because the potential benefits of designating critical habitat essential for the conservation of these species outweigh the risks that may result from human activity because of critical habitat designation.

In this proposal, we determine that critical habitat designation is not prudent for two species, *Pritchardia affinis* and *Pritchardia schattaueri*, because it would likely increase the threat from vandalism or collection of these species on the island of Hawaii. In addition, we propose that critical habitat designation is not prudent for two species, *Cyanea copelandii* ssp. *copelandii* and *Ochrosia kilaueaensis*, known only from the island of Hawaii, that have not been seen in the wild since 1957 and 1927, respectively, and for which no viable genetic material is known to exist.

In this proposal, we propose designation of critical habitat for 47 of the 58 species reported from the island of Hawaii: *Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum* var. *tomentosum*, and *Zanthoxylum hawaiiense*.

Critical habitat is not proposed for 4 (*Pritchardia affinis, Pritchardia schattaueri, Cyanea copelandii* ssp. *copelandii*, and *Ochrosia kilaueaensis*) of the 58 species reported from the island of Hawaii for which we determine that designation of critical habitat is not prudent for the reasons given above.

Critical habitat is not proposed for 7 (*Cenchrus agrimonioides, Ctenitis squamigera, Hedyotis cookiana, Mariscus pennatiformis, Phlegmariurus mannii, Phyllostegia parviflora*, and *Plantago princeps*) of the 58 species on the island of Hawaii because these plants no longer occur on the island of Hawaii and we are unable to identify any habitat essential to their conservation on this island. However, proposed critical habitat designations, or non-designations, for these species will be included in other Hawaiian plants proposed critical habitat rules (Table 2).

TABLE 2.—LIST OF PROPOSED RULES IN WHICH CRITICAL HABITAT DESIGNATIONS OR NON-DESIGNATIONS WILL BE PROPOSED FOR SEVEN SPECIES FOR WHICH WE ARE UNABLE TO DETERMINE HABITAT THAT IS ESSENTIAL FOR THEIR CONSERVATION ON THE ISLAND OF HAWAII

Species	Proposed rules in which critical habitat designations or non-designations will be made.
Cenchrus agrimonioides.	Maui; Lanai; Oahu.
Ctenitis squamigera ..	Kauai; Maui; Lanai; Molokai; Oahu.
Hedyotis cookiana	Kauai; Molokai; Oahu.
Mariscus pennatiformis.	Kauai; Maui; NW Hawaiian Islands; Oahu.
Phyllostegia mannii ...	Kauai; Maui.
Phyllostegia parviflora	Maui; Oahu.
Plantago princeps	Kauai; Maui; Molokai; Oahu.

The Island of Hawaii

This largest island of the Hawaiian archipelago comprises 10,458 square kilometers (km) (4,038 square miles (mi)) or two-thirds of the land area of the State of Hawaii giving rise to its common name, the ''Big Island.'' The Hawaiian Islands are volcanic islands formed over a ''hot spot,'' a fixed area of pressurized molten magma deep within the Earth. As the Pacific Plate, a section of the Earth's surface many miles thick, has moved to the northwest, the islands of the chain have separated. Currently, this hot spot is centered under the southeast part of the island of Hawaii, which is one of the most volcanic areas on Earth. Five large shield volcanoes make up the island of Hawaii: Mauna Kea at 4,205 meters (m) (13,796 feet (ft)), and Kohala at 1,670 m (5,480 ft), both extinct; Hualalai at 2,521 m (8,271 ft), which is dormant and could erupt again; and Mauna Loa, at 4,169 m (13,677 ft) and Kilauea at 1,248 m (4,093 ft), both of which are currently active and adding land area to the island (McDonald *et al.* 1983; 59 FR 10305; United States Fish and Wildlife Service (Service) 1996a).

The island of Hawaii lies within the trade wind belt. Moisture derived from the Pacific Ocean is carried to the island by north-easterly trade winds. Heavy rains fall when the moisture in clouds makes contact with windward mountain slopes (Wagner *et al.* 1999). Considerable moisture reaches the leeward slopes of the saddle area between Mauna Loa and Mauna Kea, but dries out rapidly as elevation increases. The orographic effect reaches an elevation of about 2,000 to 3,000 m (6,500 to 9,850 ft) and tends to go around rather than over the high mountains. Thus, leeward and saddle areas of Mauna Kea and Mauna Loa tend to be dry (Service 1996a).

A rain shadow effect is created by Mauna Kea and Mauna Loa on the leeward side of the island, removing the Kona coast from trade winds. However, warm air generated from the island land mass rises and condenses, resulting in convectional showers. A major source of rainfall is provided by winter storms which develop south of the island. Kona storms impact the island when trade winds subside during the winter months. Areas of the saddle are protected from these storms by Hualalai volcano and, therefore, droughts in the saddle area are common. Fog drip, the condensation of moisture on vegetation, can be a significant source of precipitation as well as an effective contributor in reducing evapotranspiration losses, especially in dry areas (Service 1996a; Wagner *et al.* 1999).

The Kau Desert is located on the southeastern side of the island of Hawaii and leeward to the slopes of Kilauea volcano. Lying in the volcano's rain shadow, Kau Desert receives less than 1,200 millimeters (mm) (47 inches (in)) of moisture per year. However, the barren conditions are not attributed to lack of moisture but, rather, to acid rain-forming sulphur dioxide vented from the caldera. Small seasonal variation in temperature occurs on the island. Average daily temperatures differ between the warmest and the coolest day only by about 4° C (7.2° F). However, daily extremes are pronounced, reflecting time of day, elevation, and weather. Wagner *et al.* (1999) reported that night is winter in Hawaii. The highest recorded temperature of 37.7° C (100° F) occurred at Pahala and the lowest of −12.7° C (9° F) on Mauna Kea (Service 1996a; Wagner *et al.* 1999).

Discussion of the Plant Taxa

Species Endemic to Hawaii

Argyroxiphium kauense (Mauna Loa silversword)

Argyroxiphium kauense, a long-lived perennial and a member of the aster family (Asteraceae), is a primarily monocarpic (flowering and fruiting only once and then dying, usually after several years) giant rosette plant with leaves covered with grayish-silver hairs. It differs from *Argyroxiphium sandwicense* ssp. *sandwicense* and *Argyroxiphium sandwicense* ssp. *macrocephalum* primarily by having the vegetative rosette of leaves elevated on an erect stem, longer and thinner leaves which are triangular rather than flat in cross-section, and somewhat sparser leaf pubescence (hairs) (Carr 1985; Carr 1999; Meyrat 1982).

The species is primarily monocarpic, that is, most individuals grow and flower from a large rosette. The plant increases in rosette diameter and stem height for a number of years, and then produces a single, tall inflorescence (flowering part of plant) with hundreds of capitula (heads), each containing up to 200 florets (small flowers that are part of a dense cluster). After fruit set, the entire plant dies. In the Upper Waiakea population, only 4 of the 86 plants in 1990 had more than a single rosette (that is, were branched). Three of these had two rosettes and one plant had three rosettes. At Keapohina, 30 percent (62) of the 205 plants examined in 1984 were branched. About 71 percent (44) of the branched silverswords had suffered browse damage to the apical meristem (the growing point at the tip of a stem, gives rise to stem, leaves and flowers). Branching is a common response to mechanical (browse) damage to the apical meristem in monocarpic silverswords, but may also be a trait with a genetic component. The majority of individuals of the *Argyroxiphium kauense* are monocarpic, unbranched plants. Adult individuals that have branched in response to browse damage may produce small flowering stalks. Fruits collected in 1991 from inflorescences of branched individuals were not viable. Fruits collected in 1984 from Keapohina were primarily from the small inflorescences produced on browsed plants, and the number of fruits that had seeds with embryos was low (Service 1996c; 58 FR 18029; Joan Canfield, formerly with the Service, pers. comm. 1992).

Historically, *Argyroxiphium kauense* may have once occurred in subalpine forests, bogs, and mountain parkland between 1,585 and 2,500 m (5,200 and 8,000 ft) elevation in a band from the southwest rift to the northeast slope of Mauna Loa and on Hualalai. The species is currently extant in three wild populations containing a total of fewer than 500 individuals on private land on Kahuku Ranch and on State owned land in the Upper Waiakea and Kapapala Forest Reserves. In addition, the Kapapala population has been augmented with approximately 1,000 individuals and there is an outplanted population of about 1,000 individuals in Hawaii Volcanoes National Park (Bryan *in litt.* 1974; Carr 1985; Hawaii Natural Heritage Program (HINHP) Database 2000; Marie Bruegmann, Service, pers. comm. 2001; Geographic Decision Systems International (GDSI) 2000).

The habitat of this species includes moist open forest, subalpine mesic shrubland, bogs, and weathered, old pahoehoe (smooth) or aa (rough) lava with well developed pockets of soil in subalpine mountain vegetation between 1,625 and 2,774 m (3,330 and 9,100 ft) elevation. Associated native plant species include *Coprosma montana* (pilo), *Plantago hawaiensis* (laukahi kuahiwi), *Silene hawaiiensis* (No Common Name (NCN)), *Asplenium fragile* var. *insulare* (NCN), *Metrosideros polymorpha* (ohia), *Styphelia tameiameiae* (pukiawe), *Coprosma ernodeoides* (nene), *Vaccinium reticulatum* (ohelo ai), *Dubautia ciliolata* (naenae), *Geranium cuneatum* (nohoanu), *Carex montis-eeka* (NCN), *Carex alligata* (NCN), *Rhynchospora chinensis* (kuolohia), *Dodonaea viscosa* (aalii), *Gahnia gahniiformis* (NCN), or *Deschampsia nubigena* (hair grass) (HINHP Database 2000; Linda Pratt, U.S. Geological Survey—Biological Resources Division, *et al.,* pers. comm. 2001; 58 FR 18029).

The threats to this species are browsing by cattle (*Bos taurus*), goats (*Capra hircus*), and mouflon sheep (*Ovis musimon*); habitat disruption by feral pigs (*Sus scrofa*); insects (including fruit parasites); drought; human disturbance; competition with non-native plants; disease; and vulnerability to extinction from chance events (such as volcanic activity, earthquakes, hurricanes, fires or other natural disasters) due to the small population size and limited distribution (J. Canfield, pers. comm. 1992; Mitchell 1981; Cuddihy and Stone 1999; Service 1996c; 58 FR 18029; Medeiros *et al.* 1991).

Clermontia drepanomorpha (oha wai).

Clermontia drepanomorpha, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a terrestrial or epiphytic (not rooted in the soil) branching tree with stalked leaves. This species is

distinguished from others in this endemic Hawaiian genus by similar sepals (outermost or lowermost whorl of flower parts) and petals, the long drooping inflorescence, and large blackish purple flowers (Lammers 1999).

No life history information is available for *Clermontia drepanomorpha* at this time (Service 1998c).

Historically, *Clermontia drepanomorpha* was known only from the State of Hawaii's Puu O Umi Natural Area Reserve (NAR) in the Kohala Mountains (puu = summit, hill). Currently there is a single large population containing approximately 200 individuals. It is located in the Puu O Umi NAR and Kohala Forest Reserve on State and privately owned lands. This species has also been outplanted in the State-owned Waimanu bog in the Kohala Mountains (HINHP Database 2000; Stemmermann and Jacobson 1987; GDSI 2000; Steve Perlman, National Tropical Botanical Garden (NTBG) *in litt.* 1995; Lyman Perry, Hawaii Division of Forestry and Wildlife (DOFAW), pers. comm. 2000; L. Pratt *et al.,* pers. comm. 2001).

This species typically grows in *Metrosideros polymorpha, Cheirodendron trigynum* (olapa), and *Cibotium glaucum* (hapuu) dominated montane wet forests, sometimes epiphytically, at elevations between 808 and 1,676 m (2,650 and 5,500 ft). Associated native plant taxa include *Carex alligata, Melicope clusiifolia* (alani), *Styphelia tameiameiae, Astelia menziesii* (painiu), *Rubus hawaiiensis* (akala), *Cyanea pilosa* (haha), *Coprosma* sp. (pilo), or native sphagnum moss (Corn 1983; HINHP Database 2000; Service 1998c, L. Pratt *et al.,* pers. comm., 2001).

The threats to this species are competition from non-native plant taxa such as *Rubus rosifolius* (thimbleberry), habitat disturbance by feral pigs, girdling of the stems by rats (*Rattus* spp.), and a risk of extinction from naturally occurring events (such as hurricanes) due to its narrow distribution (Service 1998c; 61 FR 53137).

Clermontia pyrularia (oha wai)

Clermontia pyrularia, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a tree with finely toothed leaves attached to a winged stalk. This species is separated from the other taxa in the genus that occur on the island of Hawaii by winged leaf stalks (petioles), two-lipped flowers, green-white petals, and a pear-shaped berry (Lammers 1991, 1999).

Clermontia pyrularia was observed in fruit and flower during December and November. No other life history information is currently available (Service 1996a).

Historically, *Clermontia pyrularia* was known only from the western and northeastern slope of Mauna Kea, the western slope of Mauna Loa and the saddle between the two. Currently this species is known from one population with several individuals on the boundary of the Hilo Forest Reserve on State-owned land. There are also two outplanted populations, at Piha on State owned land, adjacent to the Hakalau Forest National Wildlife Refuge (NWR) and in Hawaii Volcanoes National Park (HVNP) (Service 1996a; 59 FR 10305; HINHP Database 2000; GDSI 2000; Jack Jeffrey, Hakalau NWR, and Steve Bergfeld, DOFAW, pers. comm. 1999; Patty Moriyasu, Hawaii Center for Conservation Research and Training, University of Hawaii (CCRT–UH), pers. comm. 2000).

The habitat for this species includes wet and mesic montane forest dominated by *Acacia koa* (koa) and/or *Metrosideros polymorpha,* and subalpine dry forest dominated by *Metrosideros polymorpha,* at elevations between 1,628 and 2,061 m (5,340 to 6,760 ft). Associated native plants taxa are *Coprosma* sp., *Dryopteris wallichiana* (io nui), *Rubus hawaiensis,* or *Hedyotis* sp. (NCN) (HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001; 59 FR 10305).

The threats to this plant are competition with non-native plants, particularly *Passiflora mollissima* (banana poka), pigs, fruit and seed predation by *Rattus* sp. (black rat), scattered distribution, few populations, and small number of individuals making this taxon highly vulnerable to extinction caused by random naturally occurring events and human impacts, loss of pollinators, and cattle (59 FR 10305; Service 1996a).

Cyanea copelandii ssp. *copelandii* (haha).

Cyanea copelandii ssp. *copelandii,* a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a small epiphytic shrub which roots at the nodes and grows on rocks and tree trunks. This species is distinguished from other members of the genus by the size, shape, and dark red hairs of the petals and by the reclining habit. This taxon is easily distinguished by its narrow leaves from the only other subspecies, *Cyanea copelandii* ssp. *haleakalaensis,* which is relatively prolific on Maui (Lammers 1999).

Cyanea copelandii ssp. *copelandii* was observed in fruit and flower during December. No other life history information is currently available (Service 1996a).

Historically, *Cyanea copelandii* ssp. *copelandii* was found at two sites on the southeastern slope of Mauna Loa, near Glenwood. It has not been observed in the wild since 1957 (Lammers 1999).

Cyanea copelandii ssp. *copelandii* was found in montane wet forest, epiphytic on mossy *Cibotium* spp. (hapuu) between an elevation of 658 and 881 m (2,160 and 2,890 ft). Associated native plant species included *Metrosideros polymorpha, Acacia koa, Cheirodendron trigynum, Broussaisia arguta* (kanawao), or *Melicope clusiifolia* (59 FR 10305, L. Pratt *et al.,* pers. comm. 2001).

The threats to *Cyanea copelandii* ssp. *copelandii* included grazing by feral ungulates and fruit and seed predation by rats. The loss of pollinators may have contributed to lack of regeneration (Service 1996a).

Cyanea hamatiflora (haha).

Cyanea hamatiflora, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a palm-like tree with tan sap and leaves without stalks. This species is composed of two subspecies: *Cyanea hamatiflora* ssp. *carlsonii,* endemic to the island of Hawaii, and *Cyanea hamatiflora* ssp. *hamatiflora,* endemic to East Maui. *Cyanea hamatiflora* ssp. *carlsonii* is distinguished from *C. hamatiflora* ssp. *hamatiflora* by calyx (collective term for sepals, outermost or lowermost whorl of flower parts) lobes that are longer and wider and by its longer pedicels (flower stalk) (Lammers 1999).

This taxon was observed in flower during December and August. Seeds have been collected in October and November. No other life history information is currently available (Service 1996a).

Historically, *Cyanea hamatiflora* ssp. *carlsonii* was known only from the west side of the island of Hawaii. Currently, it occurs in three populations containing approximately 14 individuals on the State's Honuaula Forest Reserve and South Kona Forest Reserve. It has also been reported from Federal land on the Kona unit of Hakalau Forest National Wildlife Refuge. There are also individuals of this taxon outplanted at Puu Waawaa and the Kipahoehoe NAR (GDSI 2000; HINHP Database 2000; Jon Giffin, DOFAW, *in litt.* 2000; L. Perry, pers. comm. 2000).

The habitat of *Cyanea hamatiflora* ssp. *carlsonii* is mesic montane forest dominated by *Metrosideros polymorpha*

or *Acacia koa* at elevations between 1,350 to 1,783 m (4,430 to 5,850 ft). Associated native plants include *Myoporum sandwicense* (naio), *Clermontia clermontioides* (oha wai), *Coprosma* sp., *Ilex anomala* (kawau), *Hedyotis* sp., *Sophora chrysophylla* (mamane), *Cibotium* spp., *Dryopteris* sp. (NCN), or *Athyrium* (*Diplazium*) sp. (NCN) (Lammers 1999; HINHP Database 2000, L. Pratt *et al.,* pers. comm. 2001).

The threats to *Cyanea hamatiflora* ssp. *carlsonii* are competition with non-native plants, especially *Passiflora mollissima;* grazing and trampling by domestic and escaped cattle; rooting by feral pigs; and consumption of fruits by rats and non-native birds; seed damage by an undetermined species of caterpillar; and depressed reproductive vigor due to the limited gene pool. The small remaining numbers of individuals and their limited and scattered distribution make this species vulnerable to extinction by a single natural or human-induced event (59 FR 10305; Service 1996a).

Cyanea platyphylla (haha).

Cyanea platyphylla, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched palm-like shrub with stems that are covered with short, sharp, pale spines on the upper portions, especially when juvenile. The species differs from others in this endemic Hawaiian genus by its juvenile and adult leaves, precocious flowering, and smaller flowers (Lammers 1999).

No life history information is available for *Cyanea platyphylla* at this time (Service 1998c).

Historically, *Cyanea platyphylla* was found in the Kohala Mountains near Hiilawe Falls and also the Hamakua Ditch Trail, in Honaunau, in the Puna District near Glenwood, on Kalapana Road in Pahoa, and in Puu Kauka; in Waiakea Forest Reserve; and in an unknown location called ''Kalanilehua.'' Currently there are a total of nine populations and fewer than 50 individuals on State and private lands. This species is extant in the Laupahoehoe NAR, Hilo Forest Reserve, and Punahoa Ahupuaa. There is also an outplanted population in the Waiakea Forest Reserve (Service 1998c; GDSI 2000; HINHP Database 2000).

This species is typically found in open *Metrosideros polymorpha-Acacia koa* lowland and montane wet forests at elevations between 137 and 1,082 m (450 and 3,550 ft). Associated native plant taxa include *Coprosma* sp., *Psychotria hawaiiensis* (kopiko), *Perrottetia sandwicensis* (olomea), *Scaevola* spp. (naupaka), *Cibotium* sp., *Antidesma platyphyllum* (hame), *Clermontia* spp. (oha wai), *Hedyotis* sp., or *Cyrtandra* spp. (haiwale) (Lammers 1999; HINHP Database 2000; Service 1998c, L. Pratt *et al.,* pers. comm. 2001).

The threats to this plant are habitat degradation by feral pigs; competition with the introduced plant taxa *Psidium cattleianum* (strawberry guava), *Psidium guajava* (guava), *Passiflora ligularis* (sweet granadilla), and *Rubus rosifolius;* consumption of fruits by rats; volcanic activity; risk of extinction from naturally occurring events; and/or reduced reproductive vigor due to the low numbers of populations and individuals (Service 1998c; 61 FR 53137).

Cyanea shipmanii (haha).

Cyanea shipmanii, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a small unbranched or sparsely branched shrub with leaves that are deeply divided towards the midrib. This taxon is easily distinguishable from other members of the genus by its small flowers, slender stems, and stalked and divided leaves (Lammers 1999).

No life history information is available for *Cyanea shipmanii* at this time (Service 1996a).

Historically, *Cyanea shipmanii* was known only from the eastern slopes of Mauna Kea. Currently there are a total of five populations with 12 individuals on State land in north Hilo, Upper Waiakea Forest Reserve; on Federal land in the Hakalau Unit of the Hakalau Forest National Wildlife Refuge; and on private land at Papaikou, south Hilo (Lammers 1999; GDSI 2000; HINHP Database 2000).

Cyanea shipmanii is found in montane mesic forest dominated by *Acacia koa-Metrosideros polymorpha* on the windward slopes of the island, at elevations between 1,619 and 2,027 m (5,310 and 6,650 ft). Associated native plants include *Ilex anomala, Myrsine lessertiana* (kolea), or *Cheirodendron trigynum* (59 FR 10305, HINHP Database 2000; L. Pratt *et al.*, pers. comm. 2001).

This plant is threatened by pig rooting, vulnerability to extirpation by random events, and a loss of pollinators. Small numbers of extant individuals and localized distribution may result in a limited gene pool and reduced reproductive vigor (59 FR 10305).

Cyanea stictophylla (haha).

Cyanea stictophylla, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a small tree or shrub with sparsely branched stems that are occasionally equipped with sharp outgrowths. *Cyanea stictophylla* is distinguished from other species in the genus by its large, deeply lobed petals and small calyx lobes (Lammers 1999).

Cyanea stictophylla was observed in flower during March. No other life history information is currently available (Service 1996a).

Cyanea stictophylla is known historically from the western, southern, southeastern, and eastern slopes of Mauna Loa. Since 1975, the species has been found near Keauhou, Honokua, and Puu Waawaa in five populations totaling 10 individuals on State and private lands (Lammers 1999; GDSI 2000; HINHP Database 2000).

The species is found in *Acacia koa* or wet *Metrosideros polymorpha* forests at elevations between 1,183 and 1,942 m (3,880 and 6,370 ft). Associated native plant species include *Melicope* spp. (alani), *Cibotium* sp., or *Urera glabra* (opuhe) (HINHP Database 2000; Lammers 1999; Service 1996a, L. Pratt *et al.,* pers. comm. 2001).

The primary reasons for decline of this species are habitat destruction by cattle grazing and habitat degradation by feral pigs. In addition, the small number of plants and the scattered distribution of populations makes the species susceptible to extinction caused by naturally occurring random events and decreased reproductive vigor (Service 1996a).

Cyrtandra giffardii (haiwale).

Cyrtandra giffardii, a member of the African violet family (Gesneriaceae) and a short-lived perennial, is a small shrubby tree with oppositely-arranged leaves positioned on the upper nodes of the stem. *Cyrtandra giffardii* is distinguished from other closely aligned taxa by papery textured and elliptically shaped leaves, small, cylindrical petals, small calyx, three to five flowers per cluster, the presence of hairs on leaves and flower clusters, and an almost round berry shape (Wagner *et al.* 1999).

Cyrtandra giffardii was observed in fruit and flower during June and November, and in flower during January and December. No other life history information is currently available (Service 1996a).

Cyrtandra giffardii is known from the northeastern slope of Mauna Kea south to the eastern slope of Mauna Loa. Since 1975, seven populations have been identified with the total number of individuals estimated at less than 500. These populations occur near Puu Makaala, Stainback Highway, Kilau Stream in Laupahoehoe NAR, and in Hawaii Volcanoes National Park on State, Federal, and privately owned lands (Wagner *et al.* 1999; GDSI 2000; HINHP Database 2000).

The habitat of *Cyrtandra giffardii* is wet montane forest dominated by *Cibotium* sp. or *Metrosideros polymorpha* and *Metrosideros*

polymorpha-Acacia koa lowland wet forests between 637 and 1,676 m (2,090 and 5,500 ft) elevation. Associated native plant species include *Hedyotis terminalis* (manono), *Astelia menziesiana, Diplazium sandwicensis* (hoio), *Perrottetia sandwicensis,* or other species of *Cyrtandra* (HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

Major threats to *Cyrtandra giffardii* are habitat degradation, rooting, and trampling by feral pigs and competition from non-native plant species such as *Andropogon virginicus* (broomsedge). The species is also susceptible to extinction due to naturally occurring random events and decreased reproductive vigor due to small numbers of populations and individuals (Service 1996a).

Cyrtandra tintinnabula (haiwale).

Cyrtandra tintinnabula, a member of the African violet family (Gesneriaceae) and a short-lived perennial, is a small shrub. *Cyrtandra tintinnabula* can be distinguished from the other species in the genus that occur on the island of Hawaii by its petal size and shape, calyx size and shape, the number of flowers per cluster, and the presence of hairs. The species differs from *Cyrtandra giffardii* in its shrubby habit, larger leaves, and shorter main cluster stalks and flower stalks (Wagner *et al.* 1999).

Cyrtandra tintinnabula was observed in flower during July and August, and in fruit during December. No other life history information is currently available (Service 1996a).

Cyrtandra tintinnabula is known from three locations on the northeastern slopes of Mauna Kea. Since 1975, three populations have been identified in the State's Laupahoehoe NAR. Currently, a total of six populations with close to 25 individuals are known on State and private lands (59 FR 10305; GDSI 2000; HINHP Database 2000).

Cyrtandra tintinnabula grows in lowland wet forest dominated by dense *Acacia koa, Metrosideros polymorpha,* and *Cibotium* spp. at elevations between 390 and 1,430 m (1,280 and 4,690 ft). Several other *Cyrtandra* or *Hedyotis* species are associated with *Cyrtandra tintinnabula.* (Wagner *et al.* 1999; HINHP Database 2000; L. Pratt *et al.*, pers. comm. 2001).

The main threat to *Cyrtandra tintinnabula* is rooting and browsing by feral pigs that directly damage and disturb its habitat and break its weak and delicate stems. Pigs also disturb native vegetation which increases invasion and establishment of non-native plant taxa. Continued disturbance exacerbates the non-native plant problem and eventually precludes the survival of native taxa. Additionally, because much of the native habitat is lost, appropriate pollinators may be absent as well. The loss of native pollination vectors is a probable cause for the species' demise. *Cyrtandra tintinnabula* is also vulnerable to extinction due to naturally occurring events and decreased reproductive vigor due to small population sizes and a limited distribution (Service 1996a; 59 FR 10305).

Hibiscadelphus giffardianus (hau kuahiwi).

Hibiscadelphus giffardianus, a member of the mallow family (Malvaceae) and a long-lived perennial, is a small tree with whitish bark. This species differs from others in this endemic Hawaiian genus by its flower color, flower size, and the presence of filamentous bracts (Bates 1999).

No life history information is available for *Hibiscadelphus giffardianus* at this time.

Only one tree of *Hibiscadelphus giffardianus* has ever been known in the wild, from Kipuka Puaulu (or Bird Park) in Hawaii Volcanoes National Park (kipuka = vegetated area surrounded by bare lava flows), which died in 1930. Individuals were cultivated by Territorial Forestry (Hawaii's Department of Land and Natural Resources (DLNR) prior to statehood in 1959) from this parent tree. Approximately eleven plants were outplanted into Kipuka Puaulu somewhere between 1951 and 1964, and there are currently 100 outplanted plants surviving at this site in Hawaii Volcanoes National Park. This species only persists through cultivation efforts (GDSI 2000; L. Pratt *et al.*, pers. comm. 2001; Service 1998c).

Hibiscadelphus giffardianus grows in mixed montane mesic forest at elevations between 1,192 and 1,277 m (3,910 and 4,190 ft). Associated native plant taxa include *Metrosideros polymorpha, Acacia koa, Sapindus saponaria* (manele), *Coprosma rhynchocarpa* (pilo), *Pipturus albidus* (mamaki), *Psychotria* sp. (kopiko), *Nestegis sandwicensis* (olopua), *Melicope* spp., *Dodonaea viscosa,* or *Myoporum sandwicense* (Service 1998c; L. Pratt *et al.*, pers. comm. 2001).

The major threats to *Hibiscadelphus giffardianus* are bark, flower, and fruit feeding by black rats; leaf damage in the form of stippling and yellowing by *Sophonia rufofascia* (two-spotted leafhopper) and yellowing by the native plant bug *Hyalopeplus pellucidus;* competition from the non-native grasses *Ehrharta stipoides* (meadow ricegrass), *Paspalum conjugatum* (Hilo grass), and *Paspalum dilatatum* (Dallis grass); and possible habitat modification from volcanic activity. This species also faces a risk of extinction from naturally occurring events or reduced reproductive vigor due to the small number of existing cultivated individuals. Cattle were known in the area before it became a national park and probably had a large destructive influence on the habitat as well. However, cattle are not a threat to this species now because they are no longer allowed to roam freely through the park (Service 1998c; 61 FR 53137).

Hibiscadelphus hualalaiensis (hau kuahiwi).

Hibiscadelphus hualalaiensis, a member of the mallow family (Malvaceae) and a long-lived perennial, is a small tree with whitish bark. The species is distinguished from others in the genus by its flower color, smaller flower size, and tooth-like bracts (Bates 1999).

No life history information is available for *Hibiscadelphus hualalaiensis* at this time (Service 1998c).

Hibiscadelphus hualalaiensis was historically known from three populations located in the Puu Waawaa region of Hualalai. This species only persists through cultivation efforts. There are currently two outplanted populations on the island of Hawaii on State owned land (HINHP Database 2000; L. Perry, pers. comm. 2000).

Hibiscadelphus hualalaiensis grows in dry mesic to dry *Metrosideros* forest on rocky substrate in deep soils at elevations between 509 and 1,241 m (1,670 and 4,070 ft). Associated native plant species include *Nototrichium breviflorum, Metrosideros polymorpha, Diospyros sandwicensis,* or *Sophora chrysophylla* (Service 1998c; L. Pratt *et al.*, pers. comm. 2001).

Threats to this species include fire, flower and seed predation by rats, competition form non-native plants, ranching activity, habitat change due to volcanic activity, and reduced reproductive vigor due to a small number of individuals from a single parent (Service 1998c).

Isodendrion hosakae (aupaka).

Isodendrion hosakae is a short-lived perennial member of the violet family (Violaceae). It is a branched, upright, evergreen shrub. Reproductively mature plants range from 8 to 82 centimeters (cm) (3 to 32 in) in height, and flowers and fruit occur on the woody stems. The leathery leaves are lance-shaped and the stipules are persistent and conspicuously cover the ends of the stems. The flowers are yellowish-green to white and the fruit is a red-tinged, green, elliptical capsule (Wagner et al. 1999).

The plants are often found within the crown outline of other native shrubs suggesting that there may be a beneficial association between *Isodendrion hosakae* and these other plants. Nothing is known about the mechanisms of sexual reproduction utilized by this species. No pollinating agents have been identified, although the white flowers produce a sweet scent and numerous moths have been seen in the habitat at night. Although it has been suggested that the seeds may be wind dispersed, seedlings found underneath mature plants in windy areas may indicate that this is not the dispersal mechanism. There are no reports of vegetative reproduction of this species in nature. Attempts to grow *Isodendrion hosakae* from cuttings using several techniques have failed. Production of fruit and viable seed may be low. Nagata (1982) found that the number of fruits per plant was very low and that 8 mature fruits collected in April 1982 contained only 14 seeds. In a subsequent germination trial, only 3 of 20 seeds germinated. However, it should be noted that these observations may have been made before the peak of the fruiting season. Field observations noting phenology of *Isodendrion hosakae* have been made in the months of January, February, March, April, and November. Flowers are reported in all of these months, and fruits were seen in all of these months except January. Nagata (1982) reported that flowering and fruiting occur from November through June. Greenhouse-grown plants are known to have flowered in March and other months, and to have set new leaves in January. Clearly, these data are far too few for a reliable picture of this species' phenology (Service 1994).

The known range of this species has changed very little in the 44 years since it was first discovered in 1948 by E.Y. Hosaka on an unspecified cinder cone in Waikoloa, South Kohala. This species was again collected in 1980 in Waikoloa, sparking further searches by DOFAW botanists. These searches led to the discovery of a major population at a nearby site and a lesser colony at another site described as less than 1.6 km (1 mile) northeast of the first site and near the second site, all on privately owned land. Cuddihy *et al.* (1983) speculated that Hosaka's original collections were made at the third site. There are approximately 200 individuals in the largest population and 8 to 9 individuals at both of the other two sites. The number of plants at the other two sites are sufficiently small that they may be considered relictual or ephemeral. Only two *Isodendrion hosakae* plants are known in cultivation, and there are no other germ plasm reserves (56 FR 1454; Service 1994, HINHP Database 2000).

The existing populations of *Isodendrion hosakae* occur on the western slope of Mauna Kea. The regional vegetation is cinder cones with montane dry shrubland and elevations between 655 and 1,259 m (2,150 and 4,130 ft). Associated native plant taxa include *Dodonaea viscosa, Styphelia tameiameiae, Wikstroemia pulcherrima* (akia), *Dubautia linearis* (naenae), *Sophora chrysophylla, Osteomeles anthyllidifolia* (ulei), *Wollastonia venosa* (nehe), *Bidens menziesii* (kookoolau), or *Santalum ellipticum* (iliahi). (HINHP Database 2000; Service 1994; 56 FR 1454; L. Pratt *et al.*, pers. comm. 2001).

The principal threats to this species include habitat destruction by fire; feral ungulates; cinder mining; military activity; competition by introduced plant species, particularly *Pennisetum setaceum* (fountain grass); and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of individuals in the two remaining populations (Service 1994; HINHP Database 2000; 56 FR 1454).

Melicope zahlbruckneri (alani).

Melicope zahlbruckneri, of the citrus family (Rutaceae), is a long-lived perennial and a medium-sized tree 10 to 12 m (33 to 40 ft) tall. New growth is covered with yellowish brown, fine, short, curly hairs. The opposite, stalked, elliptically oblong leaves have well defined lateral veins. Clusters of two to five flowers top the main flowering stalks. The fruit is squarish. *Melicope zahlbruckneri* is distinguished from other species of the genus by its branching habit, large leaves, and very large, squarish capsules (Stone *et al.* 1999).

No life history information is available for *Melicope zahlbruckneri* at this time (Service 1998c).

Historically, *Melicope zahlbruckneri* was known from three populations: Near Glenwood, in Kipuka Puaulu, and at Moaula in Kau. It is currently known from two sites: in Kipuka Puaulu within Hawaii Volcanoes National Park and a recently located population on State land in Laupahoehoe. Two individuals are known from the Laupahoehoe site. The Kipuka Puaulu population consists of approximately 30 to 45 individuals with reproducing and juvenile plants (GDSI 2000; 61 FR 53137; L. Pratt *et al.,* pers. comm. 2001; HINHP Database 2000; Service 1998c).

This species is found in *Acacia koa-Metrosideros polymorpha* dominated montane mesic forest at elevations between 692 and 1,393 m (2,270 and 4,570 ft). Associated native plant taxa include *Sapindus saponaria, Coprosma rhynchocarpa, Zanthoxylum dipetalum* (ae), *Pipturus albidus, Psychotria hawaiiensis, Nestegis sandwicensis, Myoporum sandwicense, Pisonia brunoniana* (papala kepau), or *Melicope* spp. (61 FR 53137; HINHP Database 2000; Service 1998c; L. Pratt *et al.*, pers. comm. 2001).

The major threats to *Melicope zahlbruckneri* are disease transmitted by the two-spotted leafhopper, competition from introduced grasses (*Paspalum scrobiculatum* (ricegrass), *Paspalum conjugatum,* and *Paspalum dilatatum*), fire; habitat modification due to volcanic activity; and potential fruit damage by rats. This species also faces a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of individuals in the two remaining populations (61 FR 53137; Service 1998c).

Neraudia ovata (NCN).

Neraudia ovata, of the nettle family (Urticaceae), is a short-lived perennial and a sprawling or rarely erect shrub to a small tree, with stems 1 to 3 m (3 to 10 ft) long, and branches bearing short, somewhat erect hairs. The alternate, thin, stalked leaves have smooth margins, are grayish on the undersurface, and have spreading, curved, nearly translucent hairs. Male and female flowers are found on separate plants. The fruit is an achene (a dry, one-seeded fruit that does not open at maturity). This species is distinguished from others in this endemic Hawaiian genus by the density, length, and posture of the hairs on the lower leaf surface, smooth leaf margin, and the boat-shaped calyx of the female flower (Wagner *et al.* 1999).

No life history information is available for this *Neraudia ovata* at this time (Service 1998c).

Historically, *Neraudia ovata* was found from North Kona all the way to Kau. There are currently three known locations. One population of four individuals is known from privately owned land in Kaloko, North Kona. Three subpopulations with a total of 11 individuals occur on land that is under Federal jurisdiction at Pohakuloa Training Area. One individual is known from the State's Manuka NAR. In addition, five individuals are currently in cultivation at Pohakuloa Training Area (61 FR 53137; GDSI 2000; HINHP Database 2000; Bill Stormont, DOFAW, pers. comm. 2000).

Neraudia ovata grows in open *Metrosideros polymorpha-Sophora*

chrysophylla dominated lowland, montane dry forests, and *Metrosideros*-shrub woodland at elevations of 115 m (380 ft) at Kaloko and 1,325 and 1,829 m (4,350 to 6,000 ft) at Pohakuloa Training Area. Associated native plant taxa include *Reynoldsia sandwicensis* (ohe), *Myoporum sandwicense, Cocculus triloba* (huehue), *Myrsine lessertiana, Myrsine lanaiensis* (kolea), *Capparis sandwichiana* (maiapilo), *Fimbristylis hawaiiensis* (NCN), or *Bidens micrantha* ssp. *ctenophylla* (kookoolau) as well as the federally endangered *Nothocestrum breviflorum* (aiea) or *Pleomele hawaiiensis* (halapepe), (61 FR 53137; HINHP Database 2000; Service 1998c; L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Neraudia ovata* are heavy browsing and habitat modification by feral sheep (*Ovis aries*) and feral goats; competition from non-native plants such as *Schinus terebinthifolius* (Christmasberry), *Leucaena leucocephala* (koa haole), and *Pennisetum setaceum;* habitat modification due to volcanic activity; residential development; insect damage by the non-native spiraling whitefly (*Aleurodicus dispersus*); and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing individuals in the three remaining populations (61 FR 53137; Service 1998c).

Nothocestrum breviflorum (aiea).

Nothocestrum breviflorum is a long-lived perennial of the nightshade family (Solanaceae). It is a stout tree with a soft, sappy wood with dark brown bark. The leaves are relatively thick and papery in texture. The upper leaf surface is glabrous (smooth) to sparsely whitish pubescent (downy), and the lower surface is often densely whitish pubescent. Several to numerous flowers appear in clusters at the tips of shortened, spur-like branches. Fruits remain enclosed by the calyx and are orange-red, round berries about 6 to 8 mm (0.2 to 0.3 in) in diameter. This species is distinguished from other Hawaiian members of the genus by leaf shape, number of flowers (more than three) in the flower clusters at tips of short spur-like branches, and the fruit remaining enclosed in the calyx (Symon 1999).

This species was observed in flower during February, and in fruit and flower during December and January. No other life history information is currently available (HINHP Database 2000; Service 1996a).

Nothocestrum breviflorum is historically known from the southern Kohala mountains, the western, southern, and eastern slopes of Mauna Loa, and the northern slopes of Hualalai. There are 10 currently known populations totaling more than 150 individuals from State and privately owned lands in north Kona at Kaupulehu, Puu Waawaa, Kaloko, Kealakehe, Kahauloa; in Kau at Kamaoa-Puueo, in the Kohala Mountains at Kiholo and Honopue. In addition, plants were cultivated at Kipuka Puaulu in Hawaii Volcanoes National Park for ornamental purposes and there are outplanted individuals on State owned land in Puu Waawaa (59 FR 10305; Service 1996a HINHP Database 2000; GDSI 2000; L. Perry, pers. comm. 2000).

Nothocestrum breviflorum is found in lowland dry forest, montane dry forest, and montane mesic forest dominated by *Metrosideros polymorpha, Acacia koa,* and/or *Diospyros sandwicensis* (lama). Individuals occur on aa lava substrates at elevations ranging from 152 to 1,948 m (500 to 6,390 ft). Associated native plant species include *Sophora chrysophylla, Reynoldsia sandwicensis, Psydrax odorata* (alahee), *Myoporum sandwicense, Bidens micrantha, Dodonaea viscosa, Osteomeles anthyllidifolia, Santalum paniculatum* (iliahi), *S. ellipticum, Caesalpinia kavaiensis* (uhiuhi), or *Erythrina sandwicensis* (wiliwili). In addition, in the Puu Waawaa area the federally endangered *Colubrina oppositifolia* (kauila), *Kokia drynarioides* (kokio), *Hibiscadelphus hualalaiensis* (hau kuahiwi), *Delissea undulata* (NCN), or *Pleomele hawaiiensis* (hala pepe) are also known from the area where *N. breviflorum* occurs (Gagne and Cuddihy 1999; Symon 1999; 59 FR 10305; Service 1996a; HINHP Database 2000, Pratt *et al.,* pers. comm. 2001).

Nothocestrum breviflorum is negatively impacted by cattle and sheep grazing and by non-native plant taxa such as *Schinus terebinthifolius, Pennisetum setaceum, Lantana camara* (lantana), and *Leucaena leucocephala.* The presence of these invasive plant taxa may afford enough fuel to support a destructive fire. Increased residential and recreational developments have reduced available habitat. This species is also threatened by a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing individuals in the three remaining populations (59 FR 10305; HINHP Database 2000; Service 1996a).

Ochrosia kilaueaensis (holei).

Ochrosia kilaueaensis, a long-lived perennial of the dogbane family (Apocynaceae), is a tree with milky sap that grows to about 15 to 18 m (49 to 59 ft) tall. Elongated, egg- or lance-shaped leaf blades are arranged three to four at a node. Conspicuous secondary veins are almost perpendicular to the mid-vein. Numerous flowers are arranged in clusters and subtended by main flower cluster stalks divided into two sections, primary stalks (peduncles), and secondary branch stalks. The calyx is deeply 5-lobed and the green-white, trumpet-shaped flowers have five lobes fused at the base into a cylindric tube. Lance-shaped fruits have a fleshy inner layer, a stony single seed, and may be yellow-brown when mature. This species can be separated from other Hawaiian taxa of the genus by the greater height of mature trees, open flower clusters, longer flower stalks, and larger calyx and petal lobes (Wagner *et al.* 1999).

No life history information is available for *Ochrosia kilaueaensis* at this time (59 FR 10305).

Ochrosia kilaueaensis is known historically only from Puu Waawaa and at Kipuka Puaulu in Hawaii Volcanoes National Park. It has not been seen in the wild since 1927 (59 FR 10305; M. Bruegmann pers. comm. 2000).

Ochrosia kilaueaensis was found in *Acacia-Metrosideros-Sapindus* montane mesic forest between the elevations of 668 and 1,222 m (2,190 and 4,010 ft) (HINHP Database 2000; Wagner *et al.* 1999).

This species was threatened by fire, feral goats, predation of fruits by rats, and competition with fountain grass (Service 1996a).

Phyllostegia racemosa (NCN).

Phyllostegia racemosa, a short-lived perennial of the mint family (Lamiaceae), is a climbing vine with many-branched, square stems. Leaves are opposite, moderately covered with short, soft hairs, dotted with small glands, and with shallow, rounded teeth. The leaf stalks are covered densely with short hairs. This species is distinguished from others in this genus by its leaf shape, lack of a main stalk to the flower clusters, and calyx teeth that are rounded and shallow (Wagner *et al.* 1999).

No life history is available for this *Phyllostegia racemosa* at this time (61 FR 53137).

Historically, *Phyllostegia racemosa* was found in the Hakalau and Saddle Road areas of Mauna Kea and the Kulani-Keauhou and Kipuka Ahiu areas of Mauna Loa. Currently, seven populations with a total of approximately 10 individuals are known to occur on private and State lands in the Kulani-Keauhou area, on Federal lands in the Hakalau Unit of the Hakalau Forest National Wildlife Refuge and in Hawaii Volcanoes National Park

(61 FR 53137; HINHP Database 2000; GDSI 2000).

Phyllostegia racemosa is typically found epiphytically in *Acacia koa, Metrosideros polymorpha,* and *Cibotium* sp. dominated montane mesic or wet forests at elevations between 1,369 and 1,966 m (4,490 to 6,450 ft). Associated native plant taxa include *Vaccinium calycinum* (ohelo), *Rubus hawaiiensis,* or *Dryopteris wallichiana* (61 FR 53137; Service 1998c; L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Phyllostegia racemosa* are habitat disturbance by feral pigs and cattle; logging; competition from non-native plant taxa, such as *Passiflora mollissima, Pennisetum clandestinum* (kikuyu grass), *Anthoxanthum odoratum* (sweet vernalgrass), and *Paspalum urvillei* (vasey grass); habitat modification due to volcanic activity; and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing populations and individuals (61 FR 53137; Service 1998c; HINHP Database 2000).

Phyllostegia velutina (NCN).

Phyllostegia velutina, a short-lived perennial of the mint family (Lamiaceae), is a climbing vine with dense, backward-pointing hairs on the leaves and square stems. This species is distinguished from others in this genus by its silky hairs, lack of a main stalk to the flower clusters, and calyx teeth that are narrow and sharply pointed (Wagner *et al.* 1999).

No life history information is available for this *Phyllostegia velutina* at this time (61 FR 53137).

Historically, *Phyllostegia velutina* was found on the southern slopes of Hualalai and the eastern, western, and southern slopes of Mauna Loa. *Phyllostegia velutina* is currently known from five locations with approximately 100 individuals; on State and privately owned lands in the Olaa-Kilauea area, Upper Waiakea Forest Reserve, Kapapala Forest Reserve, Kau Forest Reserve, Puu Waawaa; and from Federal lands in the Hakalau Unit of the Hakalau Forest National Wildlife Refuge (61 FR 53137; GDSI 2000; HINHP Database 2000; Service 1998c).

Phyllostegia velutina typically grows in *Metrosideros polymorpha-Acacia koa* dominated montane mesic and wet forests at elevations between 908 and 1,887 m (2,980 and 6,190 ft). Associated native plant taxa include *Cibotium* spp., *Cheirodendron trigynum, Vaccinium calycinum, Coprosma* sp., *Dryopteris wallichiana, Rubus hawaiiensis, Pipturus albidus, Athyrium microphyllum* (akolea) or other native wet forest terrestrial ferns, *Myrsine lessertiana,* or *Ilex anomala* (61 FR 53137; HINHP Database 2000; Service 1998c; L. Pratt *et al.,* pers. comm. 2001).

Threats to *Phyllostegia velutina* are habitat damage by cattle, feral pigs and sheep; prison facility expansion, road clearing, and logging; competition from non-native plants, such as *Pennisetum clandestinum, Rubus ellipticus* (yellow Himalayan raspberry), *Paspalum urvillei,* and *Pennisetum setaceum;* fire; habitat modification due to volcanic activity; and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing populations and individuals (61 FR 53137; HINHP Database 2000; Service 1998c).

Phyllostegia warshaueri (NCN).

Phyllostegia warshaueri, a short-lived perennial of the mint family (Lamiaceae), is either a sprawling or climbing vine with end branches turning up, covered with upward-pointing fine, short hairs on the square stems. This species is distinguished from others in this genus by its long main stalk to the flower clusters, toothed leaves, and the distribution of hairs (Wagner *et al.* 1999).

No life history information is available for *Phyllostegia warshaueri* at this time (61 FR 53137).

Historically, *Phyllostegia warshaueri* was found in the Hamakua region on the northern slopes of Mauna Kea and in the Kohala Mountains. The only known individuals occur in 7 locations on State and privately owned lands; 3 populations with 12 individuals in Laupahoehoe NAR near the Waipunalei boundary; 2 populations in the Hilo Forest Reserve with an unknown number of individuals; and 1 population with 2 individuals in the Kohala Forest Reserve at the Ookala Trail and near the Hamakua Ditch Trail; and 1 population on private land just outside the Kohala Forest Reserve in Waipio Valley near Kaiwainui Stream. In addition, individuals have been outplanted on State land in Waimanu (61 FR 53137; HINHP Database 2000; GDSI 2000; Service 1998c; L. Perry, pers. comm. 2000).

Phyllostegia warshaueri grows in *Metrosideros polymorpha* and *Cibotium* montane and lowland wet forest in which *Acacia koa* or *Cheirodendron trigynum* may co-dominate, at elevations between 730 and 1,150 m (2,400 and 3,770 ft). Associated native plant taxa include *Antidesma platyphyllum, Psychotria hawaiiensis, Hedyotis* sp., *Coprosma* sp., *Sadleria pallida* (amau), *Broussaisia arguta, Pipturus albidus, Clermontia parviflora* (oha wai), *Athyrium sandwicensis* (NCN), *Machaerina angustifolia* (uki), *Cyanea pilosa,* or other *Cyanea* spp. (haha) (61 FR 53137; Service 1998c; HINHP Database 2000).

The major threats to *Phyllostegia warshaueri* are habitat destruction by feral pigs; competition from non-native plant taxa, such as *Rubus rosifolius, Psidium cattleianum, Setaria palmifolia* (palm grass), *Juncus planifolius* (NCN), or *Tibouchina herbacea* (glorybush); ditch improvements and road clearing; and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing populations and individuals (61 FR 53137; Service 1998c; HINHP Database 2000).

Plantago hawaiensis (laukahi kuahiwi).

Plantago hawaiensis is a short-lived perennial herb in the plantain family (Plantaginaceae) with a short stem and red-brown wooly hairs. The thick leathery basal leaves are narrowly elliptic. This species is distinguished from other members of the genus in Hawaii by several characters including ascending to sub-erect flowers, thick leathery leaves, and a fruit that is longer than the calyx (Wagner *et al.* 1999).

No life history information is available for *Plantago hawaiensis* at this time (59 FR 10305).

Historically, *Plantago hawaiensis* occurred on the southern slope of Mauna Kea, northeastern, southeastern and southern slopes of Mauna Loa, and the western slope of Hualalai. Currently, 8 populations have been identified totaling approximately 5,000 individuals on State and federally owned lands. One population is known from Kipuka Ainahou Wildlife Sanctuary, two populations each are known from Upper Waiakea Forest Reserve, Hawaii Volcanoes National Park, and Puu Waawaa and one population is known from Kapapala Forest Reserve. In addition, *Plantago hawaiensis* is currently in cultivation at Hawaii Volcanoes National Park (59 FR 10305; GDSI 2000; Warshauer 2000; HINHP Database 2000; M. Bruegmann, pers. comm. 2000).

The habitat of *Plantago hawaiensis* is somewhat variable. The taxon grows in montane wet sedge land with mixed sedges and grasses, montane mesic forest, dry subalpine woodland, or *Metrosideros* and native shrub, at elevations of 1,512 to 2,585 m (4,960 to 8,480 ft). Associated native plant species include stunted *Acacia koa* and *Metrosideros polymorpha, Styphelia tameiameiae, Vaccinium reticulatum, Dodonaea viscosa, Coprosma montana,* or *Coprosma ernodeoides. Plantago hawaiensis* is often found growing in

damp cracks of pahoehoe lava (59 FR 10305; HINHP Database 2000; Service 1996a; L. Pratt *et al.,* pers. comm. 2001).

Mouflon sheep, feral pigs, and goats threaten most of the populations. The two populations within Hawaii Volcanoes National Park are protected from feral pigs and goats by fenced exclosures but recently mouflon sheep have compromised the fence. Browsing by ungulates may affect the viability of these plants, preclude the establishment of juveniles, and damage the habitat, thereby opening suitable sites for the establishment of non-native weeds. Decreased reproductive ability due to the small number of individuals in most populations, as well as their widely scattered distribution, threaten this species. A risk of extinction from naturally occurring events and/or human activities is possible (59 FR 10305; HINHP Database 2000; Service 1996a).

Pleomele hawaiiensis (halapepe).

Pleomele hawaiiensis, a long-lived perennial of the agave family (Agavaceae), is a branching tree with leaves spirally clustered at the branch tips which leave large brown leaf scars as they fall off. This species differs from other Hawaiian species in this genus by its pale yellow flowers, the size of the flowers, the length of the constricted base of the flower, and the width of the leaves (Wagner *et al.* 1999).

No life history information is available for this *Pleomele hawaiiensis* at this time (61 FR 53137).

Historically, *Pleomele hawaiiensis* was found ranging from the Kohala mountains to Kau. Eight locations with a total of 300 to 400 individuals are currently known from State and private lands. Two populations are known from State and private lands in the Kohala mountains in Pololu Valley, three populations are known from State land in the Puu Waawaa and Puu Anahulu area, two populations are known from State and private lands in the Kaupulehu lava flow area, and one population is known from private land in the Huehue area (61 FR 53137; HINHP Database 2000; GDSI 2000; Service 1998c, L. Pratt *et al.,* pers. comm. 2001).

Pleomele hawaiiensis typically grows on open aa lava in diverse lowland dry forests and *Metrosideros-Diospyros* lowland dry forest at elevations between 152 and 969 m (500 and 3,180 ft). Associated native plant taxa include *Metrosideros polymorpha*, *Reynoldsia sandwicensis*, *Dodonaea viscosa*, *Diospyros sandwicensis*, *Sophora chrysophylla*, *Psydrax odorata*, *Cocculus trilobus*, *Myoporum sandwicense*, *Nestegis sandwicensis*, *Bobea timonioides* (ahakea), *Nototrichium sandwicense* (kului), *Sida fallax* (ilima), *Erythrina sandwicensis*, *Santalum paniculatum*, *Osteomeles anthyllidifolia*, or *Bidens micrantha* ssp. *ctenophylla* as well as the federally endangered *Caesalpinia kavaiensis, Colubrina oppositifolia, Kokia drynarioides, Nothocestrum breviflorum,* or *Neraudia ovata* (61 FR 53137; HINHP Database 2000; Service 1998c; L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Pleomele hawaiiensis* are habitat conversion associated with residential and recreational development; seed predation from weevils; habitat destruction by feral pigs, sheep, and goats; fire; competition from non-native plant taxa, such as *Pennisetum setaceum, Leucaena leucocephala, Schinus terebinthifolius,* or *Lantana camara;* habitat change due to volcanic activity; and the lack of reproduction in all but two populations (61 FR 53137; HINHP Database 2000; Service 1998c).

Pritchardia affinis (loulu).

Pritchardia affinis is a long-lived perennial in the palm family (Arecaceae) that grows from 10 to 25 m (33 to 82 ft) tall. Its orbicular and wedge-shaped, hairless leaf blades are green on the upper surface and pale green on the lower surface, with a few yellow scales. Pale, long, soft, tangled hairs extend along the fan-like folds of the leaf segments to the leaf stalk. One or more hairless flower clusters are branched and re-branched. Each flower cluster is subtended by a main flower cluster stalk (peduncle) that has bracts at the base. Upper flower cluster branches also are subtended by small membranous bracts bearing a single flower. The calyx is cup-shaped and three-lobed. Three petals are fused at the base to the stamen tube, which is comprised of six stamens (the organ of the flower which bears the pollen-grains). The immature fruit has a three-lobed stigma (the part of the female reproductive structure (pistil) of a flower on which pollen is normally deposited). The fruit is brown to black, almost round and about 2.3 cm (0.9 in) in diameter. This taxon can be distinguished from other species of *Pritchardia* by several characters including long tangled hair on the lower blade surface and leaf stalk, stout hairless flower clusters borne among wedge-shaped leaves, and an almost round fruit that is smaller than fruits of other species (Read and Hodel 1999).

No life history information is available for this *Pritchardia affinis* at this time (59 FR 10305).

Historically, *Pritchardia affinis* was known from the Kohala Mountains and along the southern and western coasts of the island of Hawaii. Currently, an unknown number of individuals are scattered along the western coast of the island of Hawaii, in Kealakekua, and in Hilo on State and private lands. Due to the use of this species as a landscape specimen and its locations in the ''wild'' near prehistoric and historic house lots, we are unable to determine the number of wild individuals or the number of wild populations. All of the extant populations may be outplanted. In addition, this palm has been propagated by the National Tropical Botanical Garden, Volcano Rare Plant Facility, and DOFAW (59 FR 10305; Service 1996a; M. Bruegmann, pers. comm. 2000).

Pritchardia affinis typically grows in coastal mesic forest, possibly near brackish water, at elevations of 0 to 610 m (0 to 2,000 ft). The trees occur in cultivated and/or developed sites, perhaps planted by Hawaiians, or may occur naturally. Because most coastal land had been historically cleared for cultivation, native associates are largely unknown (59 FR 10305; Service 1996a; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

Major threats to *Pritchardia affinis* are development and human activities including over collection and vandalism, rat predation of fruits and seeds, feral pigs, and non-native plant species. Fire is a serious threat. The small number of populations and individuals may compromise the reproductive viability of these individuals and increase the vulnerability of the taxon to random events. Lethal yellowing is a disease particular to palms that represents a potential threat if the disease ever reaches Hawaii (59 FR 10305; HINHP Database 2000; Service 1996a).

Pritchardia schattaueri (loulu).

Pritchardia schattaueri, a long-lived perennial in the palm family (Arecaceae), is a large tree, 30 to 40 m (100 to 130 ft) tall with a gray, longitudinally grooved trunk 30 cm (12 in) in diameter. Leaves form a spherical crown and are sometimes persistent after death. Leaves are fan-shaped, glossy green, with small brown scales on the lower surface. Flowers are on two- to four-branched inflorescences with a main stalk 1.2 to 1.75 m (3.9 to 5.7 ft) long and individual branches 1 to 1.4 m (3.2 to 4.6 ft) long. The five bracts are lance-shaped, the lowest one 60 cm (2 ft) long, and the uppermost one 20 to 30 cm (9 to 12 in) long. The calyx is green, fading to yellow-green at the tip and is three-toothed. Fruits are round or pear-shaped and black with brown spots when mature. This species differs from

its closest relative, *Pritchardia beccariana,* by its slender inflorescence branches, more deeply divided leaves, and pendulous rather than stiff tips of the leaf blade segments (Read and Hodel 1999).

No life history information is available for *Pritchardia schattaueri* at this time (61 FR 53137).

Historically, *Pritchardia schattaueri* was known from the South Kona Forest Reserve on State land. Currently there is one mature individual with and fewer than 12 immature plants on privately owned land near the South Kona Forest Reserve. In addition, individuals have been propagated at the Volcano Rare Plant Facility, National Tropical Botanical Garden, Lyon Arboretum, and by DOFAW (61 FR 53137; Service 1998c; GDSI 2000; HINHP Database 2000).

Pritchardia schattaueri grows in *Metrosideros polymorpha*-dominated lowland mesic forest, at elevations between 600 and 800 m (1,970 to 2,600 ft). Associated native plant taxa include *Nestegis sandwicensis, Charpentiera obovata* (papala), *Cibotium* sp., *Myrsine* sp. (kolea), or *Pittosporum hosmeri* (hoawa) (61 FR 53137; Service 1998c; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Pritchardia schattaueri* are development and human activities including over collection and vandalism, grazing and trampling by cattle and feral pigs; competition from non-native plant taxa, such as *Psidium cattleianum, Psidium guajava, Pennisetum clandestinum, Schinus terebinthifolius,* or *Rubus rosifolius;* seed predation by rats; residential, commercial, or agricultural development; and habitat modification due to volcanic activity. There is also a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing populations and individuals, and the lack of successful regeneration. Lethal yellowing is a disease particular to palms that represents a potential threat if the disease ever reaches Hawaii (61 FR 53137; Service 1998c; HINHP Database 2000).

Sicyos alba (anunu).

Sicyos alba, an annual in the gourd family (Cucurbitaceae), is a minutely hairy, black-spotted vine. Leaves are pale, broadly heart-shaped and shallowly to deeply three- to five-lobed. This species can be distinguished from its nearest relative, *Sicyos cucumerinus,* by its white fruit without bristles and 10 or fewer female flowers per cluster (Telford 1999).

No life history is available for *Sicyos alba* at this time (61 FR 53137).

Historically, *Sicyos alba* was found in the Kilauea area. Currently, this species is known from four locations with a total of approximately 30 individuals on State and Federal lands in the Puna District. One population is known from Puu Makaala NAR, two populations from Olaa tract in Hawaii Volcanoes National Park, and one population from Olaa Forest Reserve, (61 FR 53137; HINHP Database 2000; GDSI 2000; L. Pratt *in litt.* 2000).

Sicyos alba typically grows in *Metrosideros polymorpha-Cibotium glaucum* dominated montane wet forests, at elevations between 896 and 1,576 m (2,940 and 5,170 ft). Associated native plant taxa include *Coprosma* sp., *Astelia menziesii* (painiu), *Athyrium* sp., *Psychotria* sp., *Cheirodendron trigynum, Pritchardia beccariana, Platydesma spathulata* (pilo kea), *Broussaisia arguta, Cyrtandra lysiosepala* (haiwale), *Stenogyne* sp. (NCN), *Perrottetia sandwicensis, Cyanea tritomantha* (aku), or *Athyrium microphyllum* or other ferns (61 FR 53137; Service 1998c; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Sicyos alba* are habitat damage by feral pigs; trail clearing; competition from non-native plant taxa, such as *Passiflora mollissima, Setaria palmifolia, Psidium cattleianum,* or *Rubus ellipticus;* habitat modification due to volcanic activity; and a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing individuals (61 FR 53137; Service 1998c; HINHP Database 2000).

Silene hawaiiensis (NCN).

Silene hawaiiensis, a short-lived member of the pink family (Caryophyllaceae), is a sprawling shrub with climbing or clambering stems. Stems, generally, are covered with short, sticky hairs and arise from an enlarged root. Leaves are slender, often recurved and stalkless. Flowers are arranged in loose, elongate clusters that are very sticky. *Silene hawaiiensis* can be distinguished from other species of the genus in Hawaii by several characters: sprawling habit, presence of sticky hairs, leaf shape, and color of the petals (green-white with maroon-colored backs) (Wagner *et al.* 1999).

This species was observed in flower in September and August. No other life history is known for this species (Service 1996a).

Historically, *Silene hawaiiensis* was known from the western slopes of Mauna Kea; the summit of Hualalai; Humuula Saddle; northern, southern, western, and northwestern slopes of Mauna Loa; and Kilauea Crater. Currently, at least 23 populations with a total of approximately 2,540 individuals are known from private, State, and Federal lands in the Mauna Kea Forest Reserve, Keauhou, Pohakuloa Training Area, and Hawaii Volcanoes National Park (59 FR 10305; GDSI 2000; HINHP Database 2000; Service 1996a).

Silene hawaiiensis typically occurs in montane and subalpine dry shrubland on weathered lava, but is found on variously aged lava flows and cinder substrates as well, at elevations between 896 and 3,011 m (2,940 and 9,880 ft). Associated native plant taxa are *Metrosideros polymorpha, Sophora chrysophylla, Vaccinium reticulatum, Styphelia tameiameiae, Rumex giganteus* (pawale), or *Dodonaea viscosa* (59 FR 10305; HINHP Database 2000; Service 1996a, L. Pratt *et al.,* pers. comm. 2001).

Feral goats, pigs, and sheep are detrimental to the taxon's survival. Individuals on the lower northern slope of Mauna Loa were observed having tender new growth browsed and new leaves stripped away, thus compromising the viability of these individuals. Non-native plant taxa, particularly *Pennisetum setaceum,* are a major threat imperiling the survival of *Silene hawaiiensis.* In certain areas where new lava is flowing from Kilauea, plants may be enveloped by molten lava rock and/or consumed by fire. Military training may jeopardize plants on Pohakuloa Training Area (59 FR 10305; HINHP Database 2000; Service 1996a).

Zanthoxylum dipetalum var. *tomentosum* (ae).

Zanthoxylum dipetalum var. *tomentosum* is a long-lived perennial and a tree in the citrus family (Rutaceae). It has alternate leaves comprised of three to seven leathery, elliptical, gland-dotted, smooth-edged leaflets. The undersurface of the leaflets is densely covered with fine, short hairs, and the lowest pair of leaflets is often strongly reduced. This variety is distinguished from *Zanthoxylum dipetalum* var. *dipetalum* by the hairs on the undersurface of the leaflets. It is distinguished from other Hawaiian species of the genus by its reduced lower leaflets, the presence of only one joint on some of the leaflet stalks, and the large seeds (Stone *et al.* 1999).

No life history information is available for *Zanthoxylum dipetalum* var. *tomentosum* at this time (61 FR 53137).

Only one population of *Zanthoxylum dipetalum* var. *tomentosum* has ever been known, at Puu Waawaa on

Hualalai. Currently there are eight to nine individuals located on this State owned land. In addition, two to three individuals have been outplanted in the same location (61 FR 53137; GDSI 2000; HINHP Database 2000; Service 1998c; L. Perry, pers. comm. 2000).

Zanthoxylum dipetalum var. *tomentosum* grows in *Metrosideros polymorpha* dominated montane mesic forest, often on aa lava, at elevations between 872 and 1,210 m (2,860 and 3,970 ft). Associated native plant species include *Sophora chrysophylla, Diospyros sandwicensis, Pouteria sandwicensis, Santalum paniculatum, Reynoldsia sandwicensis, Myrsine* sp., or *Psychotria* sp. (61 FR 53137; HINHP Database 2000; Service 1998c; L. Pratt *et al.,* pers. comm. 2001).

Threats to *Zanthoxylum dipetalum* var. *tomentosum* include browsing, trampling, and habitat disturbance by cattle, feral pigs, and sheep; competition from non-native plant species, such as *Pennisetum clandestinum, Pennisetum setaceum, Lantana camara, Leucaena leucocephala,* or *Grevillea robusta* (silk oak); habitat modification due to volcanic activity; and fire. In addition, *Zanthoxylum dipetalum* var. *tomentosum* is threatened by a risk of extinction from naturally occurring events and/or reduced reproductive vigor due to the small number of existing individuals in only one population (61 FR 53137; HINHP Database 2000; Service 1998c).

Multi-Island Species

Achyranthes mutica (NCN).

Achyranthes mutica, a member of the amaranth family (Amaranthaceae) and a short-lived perennial, is a many-branched shrub with egg-shaped leaves and stalkless flowers. This species is distinguished from others in the genus by the shape and size of the sepals and by characteristics of the spike, which is short and congested (Wagner *et al.* 1999).

No life history information is available for *Achyranthes mutica* at this time (Service 1999).

Historically, *Achyranthes mutica* was known from three collections from opposite ends of the main archipelago, Kauai and the island of Hawaii. Currently, this species is known only from the island of Hawaii, from the Kilohana Gulch on private land. This one population has a total of between 20 and 50 individuals (61 FR 53108; HINHP Database 2000; GDSI 2000).

Achyranthes mutica is found in *Acacia koaia* (koaia) lowland dry forest primarily in gulches but also in remnant stands of forest at elevations between 643 and 1,518 m (2,110 and 4,990 ft). Associated native plant species include *Dodonaea viscosa, Myoporum sandwicense, Osteomeles anthyllidifolia, Nestegis sandwicensis, Metrosideros polymorpha, Santalum ellipticum, Erythrina sandwicensis,* or *Sophora chrysophylla* (Service 1999; L. Pratt *et al.,* pers. comm. 2001).

The primary threats to *Achyranthes mutica* on the island of Hawaii are habitat degradation and/or destruction by cattle and feral goats, competition with non-native plants, a risk of extinction from naturally occurring events (such as landslides or hurricanes), and/or reduced reproductive vigor due to the small number of existing individuals and populations.

Adenophorus periens (pendant kihi fern).

Adenophorus periens, a member of the grammitis family (Grammitidaceae) and a short-lived perennial, is a small, pendant, epiphytic fern. This species differs from other species in this endemic Hawaiian genus by having hairs along the pinna (the leaflet of a pinnate leaf (a compound leaf, having leaflets or pinnae, arranged in a single row along each side of a common axis)) margins, by the pinnae being at right angles to the midrib axis, by the placement of the sori (a group or cluster of sporanges (sac containing spores), spore-bearing structures) on the pinnae, and the degree of dissection of each pinna (Linney 1989).

Little is known about the life history of *Adenophorus periens,* which seems to grow only in closed canopy dense forest with high humidity. Its breeding system is unknown but outbreeding is very likely to be the predominant mode of reproduction. Spores are dispersed by wind, possibly by water, and perhaps on the feet of birds or insects. Spores lack a thick resistant coat which may indicate their longevity is brief, probably measured in days at most. Due to the weak differences between the seasons, there seems to be no evidence of seasonality in growth or reproduction. *Adenophorus periens* appears to be susceptible to volcanic emissions and/or the resultant acid precipitation. Additional information on reproductive cycles, longevity, specific environmental requirements, and limiting factors is not available (Linney 1989).

Historically, *Adenophorus periens* was known from Kauai, Oahu, Lanai, East Maui, and Hilo and Waimea on the island of Hawaii. Currently, it is known from several locations on Kauai, Molokai, and Hawaii . On the island of Hawaii, it is found in a total of 13 populations containing an unknown number of individuals in the Kahaualea NAR and adjoining areas and in Hawaii Volcanoes National Park on State, Federal, and privately owned lands (Lorence and Flynn 1991; HINHP Database 2000; 59 FR 56333; GDSI 2000).

Adenophorus periens, an epiphyte usually growing on *Metrosideros polymorpha* or *Ilex anomala* or possibly other native tree trunks, is found in *Metrosideros polymorpha-Cibotium glaucum* lowland wet forest at elevations between 338 and 1,180 m (1,110 and 3,870 ft). Associated native plant species include *Broussasia arguta, Cheirodendron trigynum, Cyanea* sp. (haha), *Cyrtandra* sp. (haiwale), *Dicranopteris linnearis* (uluhe), *Freycinetia arborea* (ieie), *Hedyotis terminalis, Labordia hirtella* (NCN), *Machaerina angustifolia, Psychotria* sp., or *Psychotria hawaiiensis* (Linney 1989; 59 FR 56333; L. Pratt *et al.,* pers. comm. 2001).

The threats to *Adenophorus periens* on the island of Hawaii are habitat degradation by feral pigs and goats, competition with the non-native plant *Psidium cattleianum,* and fires and fumes from volcanic eruptions (59 FR 56333).

Asplenium fragile var. *insulare* (NCN).

Asplenium fragile var. *insulare,* a short-lived perennial and a member of the spleenwort family (Aspleniaceae), is a fern with a short sub-erect stem with a dull gray or brown main axis with two greenish ridges. This Hawaiian fern species is most similar to *Asplenium macraei.* The two can be distinguished by the size and shape of the pinnae and the number of sori per pinna (Wagner and Wagner 1992).

Little life history information is available for *Asplenium fragile* var. *insulare.* Reproductive cycles, longevity, specific environmental requirements, and limiting factors are unknown. Researchers have collected information on species composition, extent of cover, and age-class structure in six sub-populations at Pohakuloa Training Area in order to describe the populations. No gametophytes (gamete-producing life stage) were found, and the age-class structure of the sub-populations sampled was determined to be 100 percent reproductive adults because all the sporophytes (spore-producing life stage) had sori on some fronds (Service 1998a; Shaw 1992).

Asplenium fragile var. *insulare* was known historically from East Maui and on the island of Hawaii below Kalaieha, Laumaia, Keanakolu and Umikoa on Mauna Kea, Puu Waawaa on Hualalai, west Keawewai, above Kipuka Ahiu on

Mauna Loa, and near Hilo. Currently, on the island of Hawaii it is found in a total of 17 populations with more than 300 individuals. There are 13 populations in the Pohakuloa Training Area, 1 population in Hawaii Volcanoes National Park, 2 populations just south of the Upper Waiakea Forest Reserve and the Mauna Loa Forest Reserve, and 1 population in the Keokea section of the South Kona District on State, Federal, and private lands (GDSI 2000; HINHP Database 2000; Shaw 1992; 59 FR 49025).

On the island of Hawaii, *Asplenium fragile* var. *insulare* is found in *Metrosideros polymorpha* dry montane forest, *Dodonaea viscosa* dry montane shrubland, *Myoporum sandwicense-Sophora chrysophylla* dry montane forest, *Metrosideros polymorpha-Acacia koa* forest as well as subalpine dry forest and shrubland between elevations of 930 and 2,710 m (3,050 and 8,890 ft). It grows almost exclusively in big, moist lava tubes (from 3 m to 4.5 m (10 to 15 ft) in diameter), pits, deep cracks, and lava tree molds, with at least a moderate soil or ash accumulation, associated with mosses and liverworts. Infrequently, this fern has been found growing on the interface between younger aa lava flows and much older pahoehoe lava or ash deposits. Although this taxon is found in habitats with three different moisture regimes (dry, mesic and wet), the microhabitat for this plant is fairly consistent. The fern generally occurs in areas that are moist and dark. Associated native plant species include *Phyllostegia ambigua* (NCN), *Styphelia tameiameiae, Vaccinium reticulatum,* mosses, or liverworts (Gagne and Cuddihy 1999; Shaw 1992; Service 1998a; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The primary threats to *Asplenium fragile* var. *insulare* on the island of Hawaii are feral sheep, pigs and goats; military operations and/or fires resulting from these operations; construction due to military activities; volcanic activity; the non-native plant *Pennisetum setaceum;* bulldozing of jeep roads; filling in of lava tubes; and a risk of extinction due to random naturally occurring events due to the small number of existing individuals (Service 1998a; 59 FR 49025; Shaw 1992).

Bonamia menziesii (NCN).

Bonamia menziesii, a member of the morning glory family (Convolvulaceae) and a short-lived perennial, is a climbing vine with twining branches that are fuzzy when young. This species is the only member of the genus that is endemic to the Hawaiian Islands and differs from other genera in the family by its two styles, longer stems and petioles, and rounder leaves (Austin 1999).

Reproductive cycles, longevity, specific environmental requirements, limiting factors and other aspects of life history are unknown for *Bonamia menziesii* (Service 1999).

Historically, *Bonamia menziesii* was known from Kauai, Oahu, Molokai, West Maui, and eastern Hawaii. Currently, it is known on Kauai, Oahu, Lanai, Maui, and the island of Hawaii. On the island of Hawaii there is a single population containing six to eight naturally occurring individuals and 10 outplanted individuals at Kaupulehu on private land (HINHP Database 2000; L. Pratt, *et al.,* pers. comm. 2001; Mick Castillo, Service, pers. comm. 2000; GDSI 2000).

Bonamia menziesii is found in dry forest at elevations between 421 and 704 m (1,380 and 2,310 ft). Associated native plant species include *Diospyros sandwicensis, Erythrina sandwicensis, Xylosma hawaiiense* (maua), *Myrsine lanaiensis, Metrosideros polymorpha, Santalum paniculatum, Sapindus saponaria, Pouteria sandwicensis* (alaa), *Nototrichium sandwicense, Chenopodium oahuense* (aheahea), *Senna gaudichaudii* (kolomona), *Sophora chrysophylla, Sida fallax, Osteomeles anthyllidifolia, Dodonaea viscosa, Canavalia hawaiiensis* (awikiwiki), *Argemone glauca* (pua kala), *Peperomia blanda* var. *floribunda* (alaala wai nui), or *Psilotum nudum* (moa) (HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The primary threats to *Bonamia menziesii* on the island of Hawaii are habitat degradation and possible predation by wild and feral pigs, goats, and cattle; competition with a variety of non-native plant species, particularly *Pennisetum setaceum;* and fire (Service 1999).

Cenchrus agrimonioides (kamanomano).

Cenchrus agrimonioides, a member of the grass family (Poaceae), is a short-lived perennial grass with leaf blades which are flat or folded and have a prominent midrib. The two varieties, *C. agrimonioides* var. *laysanensis* and *C. agrimonioides* var. *agrimonioides,* differ from each other in that var. *agrimonioides* has smaller burs, shorter stems, and narrower leaves. *Cenchrus agrimonioides* var. *agrimonioides* is only known from the main Hawaiian Islands, while *Cenchrus agrimonioides* var. *laysanensis* is known only from the Northwestern Hawaiian Islands. This species is distinguished from others in the genus by the cylindrical to lance-shaped bur and the arrangement and position of the bristles (O'Conner 1999).

Little is known about the life history of *Cenchrus agrimonioides.* Reproductive cycles, longevity, specific environmental requirements, and limiting factors are generally unknown; however, this species has been observed to produce fruit all year, though the fruit does not appear to bear viable seeds in most cases (Service 1999).

Historically, *Cenchrus agrimonioides* var. *agrimonioides* was known from Oahu, Lanai, Maui, and an undocumented report from island of Hawaii. Currently, var. *agrimonioides* is known only from Oahu and Maui. *Cenchrus agrimonioides* var. *laysanensis* has not been seen in the Northwestern Hawaiian Islands (Laysan, Kure Atoll, Midway Atoll) since about 1950. The undocumented report of *Cenchrus agrimonioides* var. *agrimonioides* on the island of Hawaii was made in 1800 (65 FR 79192; Kapua Kawelo, U.S. Army Environmental, pers. comm. 1997; Robert Hobdy, DOFAW, pers. comm. 1997; 61 FR 53108; Service 1999; HINHP Database 2000; O'Connor 1999).

Information on the physical and biological features that are essential to the conservation of *Cenchrus agrimonioides* var. *agrimonioides* on the island of Hawaii is not available.

Threats to *Cenchrus agrimonioides* on the island of Hawaii include competition with non-native plant species and risk of extinction from naturally occurring events, and/or reduced reproductive vigor due to the small number of existing individuals (Service 1999).

Clermontia lindseyana (haha).

Clermontia lindseyana, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is a small, branched tree which is either terrestrial or epiphytic (living on the surface of other plants). It is easily separable from the other taxa within this genus by several characters: much larger leaves and flowers, similar petals and sepals, leaves which are conspicuously hairy beneath, and spreading floral lobes (Cuddihy *et al.* 1983; Lammers 1999, 1991).

Clermontia lindseyana was observed in fruit from June to October, and in flower from February to August. No other life history information is currently available (HINHP Database 2000; Service 1996a).

Currently and historically, *Clermontia lindseyana* is known from Maui and on the island of Hawaii from the eastern slope of Mauna Kea and eastern, southeastern, and southwestern slopes of Mauna Loa. Currently, on Hawaii

there are a total of 17 populations containing more than 100 individuals in or near the Kau Forest Reserve and the South Kona Forest Reserve on State land, the Kona Forest Unit of the Hakalau Forest National Wildlife Refuge on land under Federal jurisdiction, and the Hakalau Unit of the Hakalau Forest National Wildlife Refuge on Federal land (GDSI 2000; HINHP Database 2000; 59 FR 10305).

The extant populations of *Clermontia lindseyana* grow in slightly open forest cover in wet and mesic *Metrosideros polymorpha-Acacia koa* forest, *Metrosideros polymorpha* forest, and mixed montane mesic *Metrosideros polymorpha-Acacia koa* forest at elevations between 1,314 and 2,256 m (4,310 and 7,400 ft). Associated native plant taxa include: *Styphelia tameiameiae, Cheirodendron trigynum, Rubus hawaiiensis, Coprosma* sp., *Athyrium* sp., or *Peperomia* sp. (alaala wai nui) (HINHP Database 2000; Pratt *et al.,* pers. comm. 2001).

The threats to *Clermontia lindseyana* on the island of Hawaii are trampling and grazing by cattle; trampling and browsing by goats, rooting and trampling by pigs, competition with the non-native plants *Pennisetum clandestinum* or *Passiflora mollissima,* and fruit consumption by black rats (Service 1996a; Cuddihy *et al.* 1983).

Clermontia peleana (haha).

Clermontia peleana, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an epiphytic shrub or tree that grows on native trees and tree ferns. Two subspecies are recognized, *C. peleana* ssp. *singuliflora* (greenish-white petals) and *C. peleana* ssp. *peleana* (blackish-purple petals). This species can be separated from other Hawaiian members of the genus by its epiphytic growth, small triangular green calyx lobes, and single-lipped flowers (Lammers 1999, 1991).

Clermontia peleana has been observed in flower during June and November, and in fruit during November. No other life history information is currently available (Service 1996a; HINHP Database 2000).

Historically, *Clermontia peleana* ssp. *peleana* was known from the island of Hawaii, where it was found on the northeastern and southeastern slopes of Mauna Kea and from the eastern slopes of Mauna Loa (59 FR 10305). This subspecies was last collected by Ken Wood along Saddle Road in 1998 but that population was not relocated during a 1999 survey. There are records of this plant in five locations but all are believed to be dead. There were four populations in Hakalau Forest National Wildlife Refuge, four populations in the Hilo Forest Reserve and one scattered population in the Upper Waiakea Forest Reserve on Federal and State lands, but this subspecies is now known only in cultivation. *Clermontia peleana* ssp. *singuliflora* was formerly found on the island of Hawaii on the northern slope of Mauna Kea and on East Maui, but the taxon (ssp. singuliflora) has not been seen in either place since the early 1900s (HINHP Database 2000; Wagner *et al.* 1999, L. Perry, pers. comm. 2000).

Clermontia peleana grows in montane wet *Metrosideros-Cibotium* forest at elevations between 436 and 1,728 m (1,430 and 5,670 ft). Associated native plant species include *Clermontia hawaiiensis* (oha kepau), *Cheirodendron trigynum, Cyrtandra platyphylla* (haiwale), *Cibotium menziesii* (hapuu), *C. chamissoi* (hapuu), *Ilex anomala, Sadleria* spp. (amau), or *Coprosma pubens* (pilo) (L. Pratt *et al.,* pers. comm. 2001).

Colubrina oppositifolia (kauila).

Colubrina oppositifolia, a member of the buckthorn family (Rhamnaceae) and a long-lived perennial, is a tree with extremely hard, red wood. This species is readily distinguished from the other species in Hawaii by characters such as opposite leaf position, dull leaf surface, and entire 2leaf margins (Wagner *et al.* 1999).

Colubrina oppositifolia was observed in fruit and flower during September and June, and in flower during December and January. No other life history information is currently available (HINHP Database 2000; Service 1996a).

Currently and historically, *Colubrina oppositifolia* is known from Oahu, Maui and the island of Hawaii. Currently, on the island of Hawaii there are a total of eight populations containing a total of fewer than 500 individuals on State and private lands. Populations are located in Kaupulehu, Puu Waawaa, Kapua, Manuka NAR, and Kamaoa-Puueo (59 FR 10305; GDSI 2000; HINHP Database 2000).

Habitats of *Colubrina oppositifolia* on the island of Hawaii are lowland dry and mesic forests dominated by *Diospyros sandwicensis* and/or *Metrosideros polymorpha,* found at elevations between 162 and 945 m (530 and 3,100 ft). Associated native plant species include *Nototrichium sandwicense, Bobea timoniodes, Rauvolfia sandwicensis* (hao), *Erythrina sandwicensis, Sophora chrysophylla, Nestegis sandwicensis, Peperomia* sp., *Psydrax odorata, Reynoldsia sandwicensis,* or *Styphelia tameiameiae* or the endangered species *Nothocestrum breviflorum* or *Pleomele hawaiiensis* (HINHP Database 2000, L. Pratt *et al.,* pers. comm. 2001).

The threats to *Colubrina oppositifolia* on the island of Hawaii are habitat destruction by feral pigs; competition with the non-native plants *Lantana camara, Pennisetum setaceum, Phymatosorus scolopendria* (bracken fern), *Passiflora suberosa* (huehue haole), or *Schinus terebinthifolius;* the introduction of *Xylosandrus compactus* (black twig borer); *Adoretus sinicus* (Chinese rose beetles); fire; small population numbers; limited distributions; and disturbance by military and unauthorized personnel such as collectors (59 FR 10305; Service 1996a).

Ctenitis squamigera (pauoa).

Ctenitis squamigera is a short-lived perennial of the spleenwort family (Aspleniaceae). It has a rhizome (horizontal stem) 5 to 10 mm (0.2 to 0.4 in) thick, creeping above the ground and densely covered with scales similar to those on the lower part of the leaf stalk. The leaf stalks are densely clothed with tan-colored scales up to 1.8 cm (0.7 in) long and 1 mm (0.04 in) wide. The sori are tan-colored when mature and are in a single row one-third of the distance from the margin to the midrib of the ultimate segments. The indusium (the membrane enclosing the sori) is whitish before wrinkling, thin, suborbicular with a narrow sinus extending about half way, glabrous except for a circular margin which is ciliolate (provided with minute marginal hairs) with simple several-celled glandular and nonglandular hairs arising directly from the margin or from the deltoid base. *Ctenitis squamigera* can be readily distinguished from other Hawaiian species of *Ctenitis* by the dense covering of tan-colored scales on its frond (Degener and Degener 1957; Wagner and Wagner 1992).

Little is known about the life history of *Ctenitis squamigera.* Flowering cycles, pollination vectors, seed dispersal agents, specific environmental requirements, and limiting factors are unknown (Service 1998a; 59 FR 49025).

Historically, *Ctenitis squamigera* was recorded from the islands of Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii. It is currently found on Oahu, Lanai, Molokai, and Maui. It was last collected on the island of Hawaii in 1909, at ''Kalua'', an indeterminable place name (HINHP Database 2001; Service 1998a).

Information on the physical and biological features that are essential to the conservation of *Ctentis squamigera* or the primary threats on the island of Hawaii is not available (HINHP Database 2001; Service 1998a).

Delissea undulata (NCN).

Delissea undulata, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched, palm-like, woody-stemmed tree, with a dense cluster of leaves at the tips of the stems. One or two knob-like structures often occur on the back of the flower tube. Three subspecies, all but the last of which are considered extinct, may be separated on the basis of leaf shape and margin characters: *D. undulata* var. *kauaiensis* (leaf blades are oval and flat-margined with sharp teeth) (Kauai), *D. undulata* var. *niihauensis* (leaf blades are heart shaped and flat-margined with shallow, rounded teeth) (Niihau), and *D. undulata* var. *undulata* (leaf blades are elliptic to lance-shaped and wavy-margined with small, sharply pointed teeth) (Maui, Hawaii). This species is separated from the other closely related members of the genus by its large flowers and berries and broad leaf bases. *Delissea undulata* ssp. *undulata* is the only subspecies found on the island of Hawaii (Lammers 1990).

Delissea undulata var. *undulata* was observed in fruit and flower during December. No other life history information is currently available (Service 1996a; HINHP Database 2000).

Delissea undulata var. *undulata* was known from southwestern Maui and western Hawaii in North and South Kona. Currently it is only known on the island of Hawaii from a single individual in Puu Waawaa on State land. Several individuals have been outplanted in this area (GDSI 2000; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

Delissea undulata var. *undulata* on the island of Hawaii occurs on dry cinder cones and in open *Sophora chrysophylla* and *Metrosideros polymorpha* forest at elevations between 890 to 1,747 m (2,920 to 5,730 ft). Associated native plant species include *Diospyros sandwicensis, Dodonaea viscosa, Psychotria mariniana* (kopiko), *P. greenwelliae* (kopiko), *Santalum paniculatum, Sophora chrysophylla,* or *Acacia koa* or the endangered *Nothocestrum breviflorum* (61 FR 53124; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The threats to *Delissea undulata* var. *undulata* on the island of Hawaii are feral sheep, goats, or pigs; cattle; small population size; competition with the non-native plant species *Passiflora mollissima, Delairea odorata* (Cape ivy), or *Pennisetum clandestinum*; fire; slugs; seed predation by rats; seed predation by introduced game birds; and extinction due to random events (Service 1996a; HINHP Database 2000).

Diellia erecta (NCN).

Diellia erecta, a member of the spleenwort family (Aspleniaceae) and a short-lived perennial, is a fern that grows in tufts of three to nine lance-shaped fronds which emerge from a rhizome covered with brown to dark gray scales. This species differs from other members of the genus in having brown or dark gray scales usually more than 2 cm (0.8 in) in length, fused or separate sori along both margins, shiny black midribs that have a hardened surface, and veins that do not usually encircle the sori (Degener and Greenwell 1950; Wagner 1992).

Little is known about the life history of *Diellia erecta*. Reproductive cycles, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999).

Historically, *Diellia erecta* was known from Kauai, Oahu, Molokai, Lanai, Maui, and the island of Hawaii. Currently, it is only known from Molokai, Maui, and Hawaii. On the island of Hawaii there are three populations containing a total of more than 20 individuals on State lands in the South Kona Forest Reserve and the Manuka Natural Area Reserve (GDSI 2000; Service 1996b; Service 1999; 59 FR 56333).

Diellia erecta on the island of Hawaii is found in *Metrosideros polymorpha-Nestegis sandwicensis* lowland mesic forest at elevations between 448 and 982 m (1,470 and 3,220 ft). Associated native plant species include *Diospyros sandwicensis, Psydrax odorata, Antidesma platyphyllum, A. pulvinatum* (hame), *Microlepia* sp. (NCN), *Nestegis sandwicensis, Wikstroemia sandwicensis* (akia), *Wikstroemia phillyreifolia* (akia), or *Nephrolepis* spp. (kupukupu) (HINHP Database 2000, L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Diellia erecta* on the island of Hawaii are habitat degradation by pigs, goats, and cattle; competition with non-native plant species, including *Blechnum occidentale* (NCN); random naturally occurring events causing extinction; and/or reduced reproductive vigor due to the small number of existing individuals (59 FR 56333; Service 1999).

Flueggea neowawraea (mehamehame).

Flueggea neowawraea, a member of the spurge family (Euphorbiaceae) and a long-lived perennial, is a large tree with white oblong pores covering its scaly, pale brown bark. This species is the only member of the genus found in Hawaii and can be distinguished from other species in the genus by its large size; scaly bark; the shape, size, and color of the leaves; flowers clustered along the branches; and the size and shape of the fruits (Hayden 1999).

Individual trees of *Flueggea neowawraea* bear only male or female flowers and must be cross-pollinated from a different tree to produce viable seed. Little else is known about the life history of this species. Reproductive cycles, longevity, specific environmental requirements, and limiting factors are unknown (Hayden 1999; Service 1999).

Historically, *Flueggea neowawraea* was known on Molokai, Oahu, Kauai, and the island of Hawaii. Currently, it is extant on Kauai, Oahu, Maui, and the island of Hawaii. On the island of Hawaii, there are a total of four populations containing around 16 to 23 individuals in Honomalino, Manuka NAR, Papa, and Huehue Ranch in North Kona on State and private lands (GDSI 2000; HINHP Database 2000).

Flueggea neowawraea on the island of Hawaii occurs in mesic *Metrosideros polymorpha* forest at elevations between 424 to 820 m (1,390 to 2,690 ft). Associated native plant species include *Nestegis sandwicensis, Psychotria hawaiiensis, Pittosporum hosmeri, Pipturus albidus, Pisonia* spp. (papala kepau), *Diospyros sandwicensis, Psydrax odorata, Antidesma platyphyllum, A. pulvinatum,* or *Nephrolepis* spp. (HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The threats to *Flueggea neowawraea* on the island of Hawaii are the black twig borer; habitat degradation by feral pigs, goats, and cattle; competition with non-native plant species such as *Schinus terebinthifolius* or *Psidium cattleianum;* fire; small population size; depressed reproductive vigor; military activities; and rat predation of the fruit (59 FR 56333; Service 1999; HINHP Database 2000).

Gouania vitifolia (NCN).

Gouania vitifolia, a member of the buckthorn family (Rhamnaceae) and a short-lived perennial, is a climbing shrub with tendriled flowering branches. This species differs from other members of its genus by having flowering branches with a tendril and coarsely crenate (wavy) to serrate-dentate (toothed) leaf margins (Wagner *et al.* 1999).

In winter and late spring the main vine of *Gouania vitfolia* produces new young side shoots which soon die. Plants have been observed flowering from late November to January, but flowering probably depends on precipitation (Service 1998b).

Historically, *Gouania vitfolia* was known from West Maui, the Kau District of the island of Hawaii, and Oahu. The species currently occurs on Oahu and

on the island of Hawaii. On the island of Hawaii, there is a single population within the State owned Manuka Natural Area Reserve containing three individuals (GDSI 2000; J. Giffin *in litt.* 2000).

The preferred habitat of *Gouania vitfolia* on the island of Hawaii is dry, rocky ridges and slopes in dry shrubland or dry to mesic *Nestegis-Metrosideros* forests on old substrate kipuka (vegetated area surrounded by bare lava flows) between 503 and 1,039 m (1,650 and 3,410 ft). Associated native plant species include *Nestegis sandwicensis, Wikstroemia sandwicensis* (akia), *Wikstroemia phillyreifolia, Nephrolepis* spp., or *Pipturus albidus* (J. Giffin *in litt.* 2000; Service 1998b; L. Pratt *et al.,* pers. comm. 2001).

The major threats to *Gouania vitfolia* on the island of Hawaii are competition with non-native plants, habitat destruction by feral pigs, and a threat of extinction due to randomly occurring natural events or reduced reproductive vigor due to the small number of extant individuals (Service 1998b; 59 FR 32932).

Hedyotis cookiana (awiwi).

Hedyotis cookiana, a member of the coffee family (Rubiaceae) and a short-lived perennial, is a small shrub with many branches and papery-textured leaves which are fused at the base to form a sheath around the stem. This plant is distinguished from other species in the genus by being entirely hairless (Wagner *et al.* 1999).

Little is known about the life history of *Hedyotis cookiana*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1995a).

Historically, *Hedyotis cookiana* was known from Hawaii, Molokai, Oahu, and Kauai. Currently, this species is only extant on the island of Kauai. It was last collected on the island of Hawaii in 1816 at Kealakekua (HINHP Database 2000).

Nothing is known of the preferred habitat for or species associated with *Hedyotis cookiana* on the island of Hawaii (Service 1995a).

Threats to *Hedyotis cookiana* included modification of habitat by feral pigs, competition with non-native plant species, extinction due to naturally occurring events, and reduced reproductive vigor due to small numbers of individuals (Service 1995a).

Hedyotis coriacea (kioele).

Hedyotis coriacea, a member of the coffee family (Rubiaceae) and a short-lived perennial, is a small, erect herb with leathery, oval-shaped leaves. *Hedyotis coriacea* is distinguished from other species of the genus by its small, triangular leaf-like appendages below the flower (calyx lobes), which do not enlarge in fruit, the combination of fruits that are longer than wide, and flower buds that are square in cross section (Wagner *et al.* 1999).

Little is known about the life history of *Hedyotis coriacea*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997a).

Until recent rediscoveries, the latest collection of *Hedyotis coriacea* was made in 1949 on the 1859 lava flow, on the island of Hawaii. A single specimen was rediscovered in the Lihau section of the West Maui NAR, and the species conceivably could exist elsewhere on Maui as well. Individuals have also been rediscovered on the island of Hawaii on the 1859 lava flow in the Pohakuloa Training Area. Currently, there are a total of 11 populations containing approximately 150 individuals all located on land under Federal jurisdiction at Pohakuloa Training Area (GDSI 2000; HINHP Database 2000; Shaw 1992).

The habitat of *Hedyotis coriacea* on the island of Hawaii is geologically young (less than 3,000 years old) Mauna Loa pahoehoe lava with sparse *Metrisuderos* forest, open *Metrisuderos* forest with sparse shrub understory or open *Metrisuderos* forest with dense shrub understory at elevations of 1,506 to 1,780 m (4,940 to 5,840 ft). Associated native plant species include *Sophora chrysophylla, Myoporum sandwicense, Dodonaea viscosa, Chenopodium oahuense, Styphelia tameiameiae, Eragrostis deflexa* (NCN), *Festuca hawaiiensis* (NCN), or the endangered *Portulaca sclerocarpa* (poe) (Shaw 1997; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

On the island of Hawaii, *Hedyotis coriacea* has been almost extirpated by the combination of cattle, fires, invasion of non-native plant species such as *Pennisetum setaceum,* and feral ungulates. Other current threats to *Hedyotis coriacea* include the very small remaining number of individuals and the limited distribution of the species which make it susceptible to extinction caused by a single natural or human-caused environmental disturbance, the limited gene pool which may depress reproductive vigor, fire accidentally set by hunters or military activities within Pohakuloa Training Area, and habitat disturbance caused by military exercises at Pohakuloa Training Area (Service 1997a).

Hibiscus brackenridgei (mao hau hele).

Hibiscus brackenridgei, a member of the mallow family (Malvaceae) and a short-lived perennial, is a sprawling to erect shrub or small tree. This species differs from other members of the genus in having the following combination of characteristics: yellow petals, a calyx consisting of triangular lobes with raised veins and a single midrib, bracts attached below the calyx, and thin stipules that fall off, leaving an elliptic scar. Two subspecies of *Hibiscus brackenridgei* are recognized, *brackenridgei* and *mokuleianus.* Subspecies *brackenridgei* is the only one currently or historically found on the island of Hawaii (HINHP Database 2000; Bates 1990).

Hibiscus brackenridgei is known to flower continuously from early February through late May, and intermittently at other times of year. Intermittent flowering may possibly be tied to day length. Little else is known about the life history of this plant. Pollination biology, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999).

Hibiscus brackenridgei ssp. *brackenridgei* was known historically from Molokai, Lanai, West Maui, and the island of Hawaii. Currently, *Hibiscus brackenridgei* ssp. *brackenridgei* is extant on the islands of Lanai, Maui, and Hawaii. On the island of Hawaii, *Hibiscus brackenridgei* ssp. *brackenridgei* is known from four populations containing a total of less than 20 individuals; one population at Puu Anahulu, one population at Puu Huluhulu, one population near the Kaupulehu Lava Flow, and one population outside Waimea town on State and privately owned lands (GDSI 2000; HINHP Database 2000).

Hibiscus brackenridgei on the island of Hawaii occurs in *Acacia koa* lowland mesic forest at elevations between 457 and 793 (1,500 and 2,600 ft). Associated native plant species include *Sida fallax* or *Reynoldsia sandwicensis* (HINHP Database 2000, L. Pratt *et al.,* pers. comm. 2001).

The primary threats to *Hibiscus brackenridgei* on the island of Hawaii are habitat degradation and possible predation by feral pigs, goats, sheep, cattle, or rats; competition with non-native plant species; road construction; fire; and susceptibility to extinction caused by randomly occurring natural events or reduced reproductive vigor due to small population size and a

limited number of populations (Service 1999; 59 FR 56333).

Ischaemum byrone (Hilo ischaemum).

Ischaemum byrone, a member of the grass family (Poaceae), is a short-lived perennial species with creeping underground and erect stems. *Ischaemum byrone* can be distinguished from other Hawaiian grasses by its tough outer flower bracts, dissimilar basic flower units which are awned, and a two-flowered, di- or trichotomously-branching (two- or three-tiered) inflorescence (O'Connor 1999).

No life history information is available for this *Ischaemum byrone* at this time (59 FR 10305).

Ischaemum byrone was historically distributed on Kauai, Oahu, Molokai, Maui, and the island of Hawaii. Currently, this species is found on Kauai, Molokai, Maui, and the island of Hawaii. On the island of Hawaii, there are a total of five populations containing approximately 3,000 individuals located along the eastern coast from Hilo to Hawaii Volcanoes National Park on private, State and federally owned lands. In addition, there are some outplanted individuals in Hawaii Volcanoes National Park (59 FR 10305; GDSI 2000; HINHP Database 2000; L. Pratt, *in litt.,* 2000).

Ischaemum byrone on the island of Hawaii is found in coastal wet to dry shrubland, near the ocean, among rocks or on pahoehoe lava in cracks and holes, and elevations between sea level and 137 m (0 and 460 ft). Associated native plant taxa include *Scaevola sericea* (naupaka kahakai), or *Fimbristylis cymosa* (mauu akiaki) (Service 1996a; 59 FR 10305; HINHP Database 2000; L. Pratt *et al.,* pers. comm. 2001).

The threats to *Ischaemum byrone* on Hawaii island are competition by non-native grasses, predation by goats, and elimination and degradation of habitat through fire and residential development (59 FR 10305; Service 1996a).

Isodendrion pyrifolium (wahine noho kula).

Isodendrion pyrifolium, a short-live perennial of the violet family (Violaceae), is a small, branched shrub with elliptic to lance-shaped leaf blades. The papery-textured blade is moderately hairy beneath (at least on the veins) and stalked. The stalk (petiole) is subtended by oval, hairy, bract-like structures (stipules). Fragrant, bilaterally symmetrical flowers are solitary. The flower stalk (pedicel) is white-hairy, and subtended by two bracts. Bracts arise at the tip of the main flower stalk (peduncle). The five sepals are lance-shaped, membranous-edged and fringed with white hairs. Five green-yellow petals are somewhat unequal, and lobed, the upper being the shortest and the lower the longest. The fruit is a three-lobed, oval capsule, which splits to release olive-colored seeds. *Isodendrion pyrifolium* is distinguished from other taxa in the genus by its smaller, green-yellow flowers, and hairy stipules and leaf veins (Wagner *et al.* 1999).

During periods of drought, this species will drop all but the newest leaves. After sufficient rains, the plants produce flowers with seeds ripening one to two months later. No other life history information is currently available for this species (Service 1996a).

Isodendrion pyrifolium is known historically from six of the Hawaiian Islands: Niihau, Molokai, Lanai, Oahu, Maui, and on the western slope of Hualalai mountain on the island of Hawaii. Currently on Hawaii island, one population is known from State land in Kealakehe homesteads with 9 individuals. In addition, seven individuals are in cultivation at botanical gardens (59 FR 10305; GDSI 2000; Service 1996a; HINHP Database 2000; M. Bruegmann pers. comm. 2000).

Isodendrion pyrifolium grows in dry forests at elevations between 18 to 137 m (60 to 450 ft). This species was formerly associated predominantly with native plant taxa such as *Psydrax odorata, Sida fallax, Myoporum sandwicense, Sophora chrysophylla,* or *Waltheria indica* (uhaloa) (59 FR 10305; Service 1996a; Pratt *et al.,* pers. comm. 2001).

The conversion of this species' natural habitat to residential and recreational developments is of grave concern, as is the presence of the aggressive non-native *Pennisetum setaceum*. Drying stands of this and other weedy species greatly increase the fire load and fire potential. Competition for nutrients with non-native plant taxa such as *Leucaena leucocephala* is a threat. Numbers of individuals are not abundant enough to maintain reproductive vigor, thus making random extirpation a possibility (Service 1996a; 59 FR 10305).

Mariscus fauriei (NCN).

Mariscus fauriei, a member of the sedge family (Cyperaceae), is a short-lived perennial plant with somewhat enlarged underground stems and three-angled, single or grouped aerial stems 10 to 50 cm (4 to 20 in) tall. It has leaves shorter than or the same length as the stems and 1 to 3.5 mm (0.04 to 0.1 in) wide. This species differs from others in the genus in Hawaii by its smaller size and its narrower, flattened, and more spreading spikelets (Koyama 1990; 59 FR 10305).

No life history information is available for *Mariscus fauriei* at this time (Service 1996b).

Historically and currently, *Mariscus fauriei* is found on east Molokai and on the island of Hawaii. This species is believed to be no longer extant on Lanai. Currently on Hawaii island, two populations with a total of 100 to 200 plants occur at South Point and in Kaloko on State and privately owned lands (59 FR 10305; HINHP Database 2000; GDSI 2000).

This species typically grows in *Diospyros sandwicensis-Metrosideros polymorpha-Sapindus saponaria* dominated lowland dry forests, often on a lava substrate, between elevations of 107 and 402 m (350 and 1,320 ft). Associated native plant species include *Sophora chrysophylla*, *Myoporum sandwicense*, *Psydrax odorata*, *Peperomia blanda* var. *floribunda*, *Osteomeles anthyllidifolia*, or *Rauvolfia sandwicensis* (59 FR 10305; HINHP Database 2000; L. Pratt et al., pers. comm. 2001).

The threats to *Mariscus fauriei* on Hawaii island are predation and habitat degradation by feral goats and competition from non-native plant species such as *Schinus terebinthifolius*, *Pennisetum setaceum*, and *Leucaena leucocephala*. Because there are only two currently known populations on Hawaii island, the species is threatened by the risk of extinction through random environmental events and through reduced reproductive vigor (Service 1996a; 59 FR 10305).

Mariscus pennatiformis (NCN).

Mariscus pennatiformis, a short-lived perennial member of the sedge family (Cyperaceae), has a woody root system covered with brown scales. *Mariscus pennatiformis* is subdivided into two subspecies, ssp. *bryanii* and ssp. *pennatiformis*, which are distinguished by the length and width of the spikelets; color, length, and width of the glume; and by the shape and length of the achenes. This species differs from other members of the genus by its three-sided, slightly concave, smooth stems; the length and number of spikelets; the leaf width; and the length and diameter of stems (Koyama 1990).

Mariscus pennatiformis is known to flower from November to December after heavy rainfall. Additional information on the life history of this plant, reproductive cycles, longevity, specific environmental requirements, and limiting factors are generally unknown (Service 1999).

Historically, *Mariscus pennatiformis* was known from Kauai, Oahu, East

Maui (Keanae Valley, Hana, and Nahiku), and from Laysan in the Northwestern Hawaiian Islands and reported from the island of Hawaii. *Mariscus pennatiformis* ssp. *pennatiformis* has not been seen on the island of Hawaii since the middle of the last century (Wagner *et al.* 1999; HINHP Database 2000; 59 FR 56333; Bruegmann, in litt., 2000).

Nothing is known of the preferred habitat for or species associated with *Mariscus pennatiformis* on the island of Hawaii (Service 1999).

The threats to *Mariscus pennatiformis* on the island of Hawaii are unknown.

Phlegmariurus mannii (wawae iole).

Phlegmariurus mannii, a member of the clubmoss family (Lycopodiaceae) and a short-lived perennial, is a hanging plant with clustered, delicate red stems and forked reproductive spikes. These traits distinguish it from others in the genus in Hawaii (Holub 1991).

Little is known about the life history of *Phlegmariurus mannii*. Reproductive cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997a).

Historically, *Phlegmariurus mannii* was known from Kauai, West Maui, and Hawaii island (Captain Cook-Kona). Currently, this species is extant on Maui. The last collection of this species on the island of Hawaii was in 1949 from South Kona near Papaloa (HINHP Database 2000).

Nothing is known of the preferred habitat of or species associated with *Phlegmariurus mannii* on the island of Hawaii (Service 1997a).

This species was threatened by habitat degradation by feral pigs and goats and stray domestic cattle, and by non-native plants such as *Rubus argutus* (blackberry), *Cyathea cooperi* (Australian tree fern), or *Psidium cattleianum*. (Service 1997a).

Phyllostegia parviflora (NCN).

Phyllostegia parviflora, a member of the mint family (Lamiaceae), is a short-lived perennial herb. The leaves are egg-shaped and wrinkled. The species is distinguished from others of the genus by the leaf shape and length of the leaf stalk and lower corolla lip. *Phyllostegia parviflora* var. *glabriuscula* has fewer glandular hairs in the inflorescence, less pubescent (hairy) leaves, and usually unbranched inflorescences, as compared to P. parviflora var. parviflora. A recently discovered, unnamed variety of *Phyllostegia parviflora* has shorter leaf stalks, spreading hairs on the leaf stalks, and fewer gland-tipped hairs in the inflorescence (Wagner *et al.* 1990).

Nothing is known of the preferred habitat of or species associated with *Phyllostegia parviflora* on the island of Hawaii (Service 1996a).

Historically *Phyllostegia parviflora* was known from three islands: Oahu, Maui, and the island of Hawaii. This species is now known only from two populations on Oahu. *Phyllostegia parviflora* has not been observed on the island of Hawaii since the 1800s (61 FR 53108; HINHP Database 2000; GDSI 2000).

Nothing is known of the preferred habitat of or species associated with *Phyllostegia parviflora* on the island of Hawaii (Service 1999).

Threats to *Phyllostegia parviflora* include habitat degradation or destruction by feral pigs, competition with non-native plant species, risk of extinction from naturally occurring events, and/or reduced reproductive vigor due to the small number of remaining individuals (Service1999).

Plantago princeps (laukahi kuahiwi).

Plantago princeps, a member of the plantain family (Plantaginaceae), is a small shrub or robust, short-lived perennial herb. Its erect or ascending stems are hollow, about 2 to 250 centimeters (1 to 100 inches) long, and often branched with internodes that are more or less woolly with reddish brown hairs when young. The oblong to elliptic, thick, leathery leaves are tufted near the ends of the stems. The leaves have smooth or minutely-toothed margins, a pointed tip, and primary veins that converge at the base of the leaves. Numerous stalkless flowers are densely arranged in a cluster, with each cluster on a stalk. Each flower spreads at an angle of nearly 90 degrees to the axis of the stalk, or grows upright. The sepals are somewhat distinct and elliptic in shape. The fruits are capsules, which contain three or four tiny black seeds. The surface of the seed is covered with a sticky membrane. This species differs from other native members of the genus by its large-branched stems, flowers at nearly right angles to the axis of the flower cluster, and fruits that break open at a point two-thirds from the base. The four varieties (*anomala*, *laxiflora*, *longibracteata*, and *princeps*) are distinguished by the branching and pubescence of the stems; the size, pubescence, and venation of the leaves; the density of the inflorescence; and the orientation of the flowers (Wagner *et al.* 1999).

Little is known about the life history of this plant. Reproductive cycles, longevity, specific environmental requirements, and limiting factors are generally unknown. However, individuals have been observed in fruit from April through September (59 FR 56333).

Plantago princeps was historically found on Kauai, Oahu, Molokai, Maui, and the island of Hawaii. It has not been seen on the island of Hawaii since the 1860s (59 FR 56333; HINHP Database 2000).

Nothing is known of the preferred habitat of or species associated with *Plantago princeps* on the island of Hawaii.

Threats to *Plantago princeps* included habitat degradation by feral pigs and goats and competition with non-native plant species (Service 1999)

Portulaca sclerocarpa (poe).

Portulaca sclerocarpa, a short-lived perennial member of the portulaca family (Portulacaceae), has a fleshy, tuberous taproot that becomes woody with maturity. Leaves are narrowly oblance-shaped to linear (strap-like), almost round in cross-section, succulent, gray-green, and stalkless. Dense tufts of yellow-brown hairs occur in the axil between stem and leaf. Three to six flowers occur at the end of the stem and form a dense white or pink flower cluster. *Portulaca sclerocarpa* is distinguished from other species of the genus in Hawaii by its woody taproot, narrow leaves, petal color, seed color (dark, reddish-brown), and thick-walled fruit (Wagner et al. 1999).

Little is known of the life history of *Portulaca sclerocarpa.*This species was observed in flower in March, June, and December. The presence of juveniles indicate that pollination and germination are occurring (Service 1996a).

Historically, *Portulaca sclerocarpa* was known from the islands of Lanai and the island of Hawaii. Populations were found on an islet off of the south coast of Lanai, and the Kohala mountains, the northern slopes of Hualalai, the northwestern slopes of Mauna Loa, and near Kilauea Crater on Hawaii island. One extant population is known to occur off the coast of Lanai on Poopoo Islet. Nineteen extant populations with approximately 1,000 individuals are known to occur on Federal, State, and private lands on Hawaii island. One population occurs at Puupa on private land; two at Nohona O Hae on private land; nine at Puu Anahulu on private, State and Federal lands (Pohakuloa Training Area); three populations on private land at Keauhou; and four populations on Federal land at Hawaii Volcanoes National Park (59 FR 10305; GDSI 2000; HINHP Database 2000; Service 1996a).

Portulaca sclerocarpa grows on weathered Mauna Kea soils, cinder cones, or geologically young lavas in montane dry shrubland. The species often is found on bare cinder, near

steam vents, and in open *Metrosideros polymorpha* dominated woodlands, at elevations between 351 and 2,274 m (1,150 to 7,460 ft). Associated native plant taxa are *Sophora chrysophylla*, *Wollastonia venosa*, or *Dodonaea viscosa* (59 FR 10305; HINHP Database 2000; Service 1996a; L. Pratt *et al.,* pers. comm. 2001).

A major threat to *Portulaca sclerocarpa* is competition from non-native grasses such as *Pennisetum setaceum* and *Andropogon virginicus*. Although no browsing has been observed, goats, pigs and sheep trample and disturb the habitat, damaging the understory and providing suitable sites for non-native plant invaders. Fire is also a pervasive problem in such dry habitat. The unknown reason for the decrease in numbers from 4,300 in 1983 to 970 in 1994 in the Puhimau geothermal (fumarole) area within Hawaii Volcanoes National Park is of concern. Small numbers of populations and individuals, and their scattered distribution, decrease reproductive viability and increase vulnerability to random events (59 FR 10305; Service 1996a; HINHP Database 2000).

Sesbania tomentosa (ohai).

Sesbania tomentosa, a short-lived perennial and a member of the pea family (Fabaceae), is typically a sprawling shrub but may also be a small tree. Each compound leaf consists of 18 to 38 oblong to elliptic leaflets which are usually sparsely to densely covered with silky hairs. The flowers are salmon-tinged with yellow, orange-red, scarlet or rarely, pure yellow. *Sesbania tomentosa* is the only endemic Hawaiian species in the genus, differing from the naturalized *Sesbania sesban* (Egyptian rattlepod) by the color of the flowers, the longer petals and calyx, and the number of seeds per pod (Geesink *et al.*1999).

The pollination biology of *Sesbania tomentosa* is being studied by David Hopper, a graduate student in the Department of Zoology at the University of Hawaii at Manoa. His preliminary findings suggest that although many insects visit *Sesbania* flowers, the majority of successful pollination is accomplished by native bees of the genus *Hylaeus* and that populations at Kaena Point on Oahu are probably pollinator limited. Flowering at Kaena Point is highest during the winter-spring rains, and gradually declines throughout the rest of the year. Other aspects of this plant's life history are unknown (Service 1999).

Currently, *Sesbania tomentosa* occurs on at least six of the eight main Hawaiian Islands (Kauai, Oahu, Molokai, Kahoolawe, Maui, and the island of Hawaii) and in the Northwestern Hawaiian Islands (Nihoa and Necker). It is no longer extant on Niihau and Lanai. On the island of Hawaii, *Sesbania tomentosa* is known from 11 populations with less than 500 individuals. Two populations occur at South Point on Federal (Government Services Administration) and State lands; one population at Hapuna Bay and another at Mahaiula Bay on State lands, and the remaining seven populations occur on Federal land at Hawaii Volcanoes National Park (59 FR 56333; Service 1999; HINHP Database 2000; GDSI 2000).

Sesbania tomentosa is found in open, dry *Metrosideros polymorpha* forest with mixed native grasses, *Scaevola sericea* coastal dry shrubland on windswept slopes, and weathered basaltic slopes between sea level and 954 m (0 and 3,130 ft) elevation. Associated native plant plant species include *Sporobolus virginicus* (akiaki), *Styphelia tameiameiae*, *Wollastonia integrifolia* (nehe), *Jacquemontia san dwicensis* (pauohiiaka), *Sida fallax*, *Ipomoea pes-caprae* (pohuehue), *Dodonaea viscosa*, *Fimbristylis hawaiiensis*, *Myoporum sandwicense*, or *Waltheria indica* (59 FR 56333; HINHP Database 2000; Service 1999; L. Pratt *et al.,* pers. comm. 2001).

The primary threats to Sesbania tomentosa on the island of Hawaii are competition with various non-native plant species such as *Cynodon dactylon* (Bermuda grass), *Chloris barbata* (swollen finger grass), *Bothriochloa pertusa* (pitted beardgrass), *Cenchrus ciliaris* (buffelgrass), *Portulaca pilosa* (pigweed), *Desmodium triflorum* (tick clover), or *Lantana camara*; fire; habitat degradation by feral cattle; lack of adequate pollination; seed predation by rats, mice and, potentially, non-native insects; and destruction by random environmental events (*e.g.,* fire) and by human activities (*e.g.,* use of off-road vehicles and development) (HINHP Database 2000; 59 FR 56333; Service 1999).

Silene lanceolata (NCN).

Silene lanceolata, a member of the pink family (Caryophyllaceae), is an upright, short-lived perennial plant with stems 15 to 50 cm (6 to 20 in) long, which are woody at the base. The narrow leaves are smooth except for a fringe of hairs near the base. Flowers are arranged in open clusters. The flowers are white with deeply-lobed, clawed petals. The capsule opens at the top to release reddish-brown seeds. This species is distinguished from *S. alexandri* by its smaller flowers and capsules and its stamens, which are shorter than the sepals (Wagner *et al.* 1999).

No life history information is available for *Silene lanceolata* at this time (57 FR 46325; Service 1996b).

The historical range of *Silene lanceolata* includes five Hawaiian Islands: Kauai, Oahu, Molokai, Lanai, and the island of Hawaii. *Silene lanceolata* is presently extant on the islands of Molokai, Oahu, and the island of Hawaii. On the island of Hawaii, 10 populations with a total of approximately 2,500 individuals are known from land under Federal jurisdiction at Pohakuloa Training Area. In addition, individuals are in cultivation at the Army's greenhouse at Pohakuloa Training Area (57 FR 46325; GDSI 2000; USAG–HI 2000b; Service 1996a).

On the island of Hawaii, this species grows on rocky tumuli or outcrops, on aa lava, in deep ash deposits over pahoehoe lava, and in Mauna Kea substrate in dry montane shrubland at elevations between 1,253 and 1,320 m (4,110 and 4,330 ft). Associated native plant species include, *Eragrostis* sp. (lovegrass), *Metrosideros polymorpha*, *Chamaesyce* sp. (akoko), *Myoporum sandwicense*, *Sophora chrysophylla*, *Chenopodium oahuense*, *Dodonaea viscosa*, *Styphelia tameiameiae*, or *Dubautia linearis* (57 FR 46325; HINHP Database 2000; Service 1996b; L. Pratt *et al.,* pers. comm. 2001).

Habitat destruction by feral ungulates (goats, mouflon sheep, and pigs), fires, competition by invading non-native plants such as *Pennisetum setaceum*, and military activity are immediate threats to *Silene lanceolata* on the island of Hawaii (57 FR 46325; Service 1996b).

Solanum incompletum (popolo ku mai).

Solanum incompletum, a short-lived perennial member of the nightshade family (Solanaceae), is a woody shrub. Its stems and lower leaf surfaces are covered with prominent reddish prickles or sometimes with yellow fuzzy hairs on young plant parts and lower leaf surfaces. The oval to elliptic leaves have prominent veins on the lower surface and lobed leaf margins. Numerous flowers grow in loose branching clusters with each flower on a stalk. This species differs from other native members of the genus by being generally prickly and having loosely clustered white flowers, curved anthers about 2 mm (0.08 in) long, and berries 1 to 2 cm (0.4 to 0.8 in) in diameter (Symon 1999).

No life history information is available for *Solanum incompletum* at this time (59 FR 56333).

Historically, *Solanum incompletum* was known from central and northeastern Lanai, scattered locations on Maui, and the Kohala Mountains, Kona, Puu Waawaa, Puu Ikaaka Crater, Kanehaha, Puu Huluhulu, and Omaokaili on the island of Hawaii. According to David Symon (1999), the known distribution of *Solanum incompletum* also extended to the islands of Kauai and Molokai. Currently, *Solanum incompletum* is only known from one population of 35 individuals, recently discovered on the Army's Pohakuloa Training Area on the island of Hawaii. In addition, nine individuals are currently in cultivation in the greenhouse at Pohakuloa Training Area (59 FR 56333; HINHP Database 2000; Service 1999; GDSI 2000; USAG-HI 2000b).

Solanum incompletum grows in dry to mesic forest, diverse mesic forest, and subalpine forest between elevations of 1,192 and 2,259 m (3,910 and 7,410 ft) and is associated with *Myoporum sandwicense*, *Myrsine lanaiensis*, or *Sophora chrysophylla* (59 FR 56333; Service 1999; L. Pratt *et al.,* pers. comm. 2001).

The primary threats to the few remaining individuals of *Solanum incompletum* are habitat degradation by feral sheep and mouflon, competition with various non-native plants, random naturally-occurring mass mortality events, and reduced reproductive vigor due to the extremely small number of existing plants. *Solanum incompletum* is potentially threatened by military activities and fire resulting from these activities at the Pohakuloa Training Area (59 FR 56333; Service 1999; HINHP Database 2000).

Spermolepis hawaiiensis (NCN).

Spermolepis hawaiiensis, an annual member of the parsley family (Apiaceae), is a slender herb with few branches. Its leaves, dissected into narrow, lance-shaped divisions, are oblong to somewhat oval in outline and grow on stalks. Flowers are arranged in a loose, compound, umbrella-shaped inflorescence arising from the stem, opposite the leaves. *Spermolepis hawaiiensis* is the only member of the genus native to Hawaii. It is distinguished from other native members of the family by being a non-succulent annual with an umbrella-shaped inflorescence (Constance and Affolter 1999).

Little is known about the life history of *Spermolepis hawaiiensis*. Reproductive cycles, longevity, specific environmental requirements, and limiting factors are unknown (59 FR 56333; Service 1999).

Historically, *Spermolepis hawaiiensis* was known from Kauai, Oahu, Molokai, Maui, Lanai and the island of Hawaii (HINHP Database 2000). Currently, it is extant on Kauai, Oahu, Molokai, Lanai, Maui, and the island of Hawaii. On the island of Hawaii, there are approximately four known populations with between 5,000 and 10,000 individuals on land under Federal jurisdiction at Pohakuloa Training Area and State land at Puuanahulu (59 FR 56333; HINHP Database 2000; GDSI 2000; Service 1999).

Spermolepis hawaiiensis is known from shady spots in *Dodonaea viscosa* lowland dry shrubland, on pahoehoe lava at elevations between 1,134 and 2,140 m (3,720 and 7,020 ft). Associated native plant species include *Myoporum sandwicense*, *Osteomeles anthyllidifolia*, or *Sophora chrysophylla* (59 FR 56333; HINHP Database 2000; Service 1999; L. Pratt *et al.*, pers. comm. 2001).

The primary threats to *Spermolepis hawaiiensis* on the island of Hawaii are habitat degradation by feral goats, pigs and sheep; competition with various non-native plants such as *Melinis minutiflora* (molasses grass) and other grasses; military impacts; and habitat destruction and extinction due to natural environmental events such as erosion, landslides, and rock slides due to natural weathering (59 FR 56333; Service 1999).

Tetramolopium arenarium (NCN).

Tetramolopium arenarium is a short-lived perennial and an upright, branched shrub in the sunflower family (Asteraceae). Alternate leaves are lance-shaped, hairy, glandular, and gray-green. This species is separated from other taxa of the genus in the Hawaiian Islands by several characters: upright habit; number of heads per flower cluster (5 to 11); presence and type of glands and hairs; size of male ray flowers (1.3 to 2.2 mm (.05 to .09 in); number of bisexual disk flowers (5 to 9) and their maroon color; and a wide, 2- to 4-nerved fruit with white hairs at the tip. Three infra-specific taxa are recognized: *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium* (Maui and Hawaii), *T. arenarium* ssp. *arenarium* var. *confertum* (Hawaii), and *T. arenarium* ssp. *laxum* (Maui). These taxa are distinguished one from the other by a combination of characters. *T. arenarium* ssp. *arenarium* var. *confertum* and *T. arenarium* ssp. *laxum* have not been seen the late 1800s (Lowrey 1999).

No life history information is available for *Tetramolopium arenarium* at this time (59 FR 10305).

Tetramolopium arenarium was historically known from the islands of Maui and Hawaii. Individuals were found on the western slope of Haleakala, Maui, and on the Kohala mountains, the northwestern slopes of Mauna Kea, Mauna Loa, and Hualalai, Hawaii. The taxon was considered extinct until *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium* was recently rediscovered in Kipuka Kalawamauna at Pohakuloa Training Area. Two populations with approximately 400 individuals of *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium* are currently extant. In addition, five individuals are in cultivation in the greenhouse at Pohakuloa Training Area (59 FR 10305; HINHP Database 2000; Service 1996a; GDSI 2000; USAG–HI 2000b).

The habitat of *Tetramolopium arenarium* on island of Hawaii is lowland and montane dry shrublands dominated by *Dodonaea viscosa*, at elevations between 1,363 and 1,762 m (4,470 and 5,780 ft). Associated native plant taxa are *Styphelia tameiameiae*, *Dubautia linearis*, *Chamaesyce olowaluana* (akoko), *Sida fallax*, *Chenopodium oahuense* or the endangered *Haplostachys haplostachya* (honohono) (59 FR 10305; Service 1996a; HINHP Database 2000; L. Pratt *et al.*, pers. comm. 2001).

Feral goats, sheep, and pigs have caused habitat destruction by browsing, trampling, and rooting. All known populations are transected by feral animal trails. Habitat decimation has resulted in opportunities for invasions by non-native plant taxa, particularly *Pennisetum setaceum*. The occurrence of *Pennisetum setaceum* increases the probability and intensity of fire. Military activity may threaten the species. The small number of extant individuals and the restricted distribution of this taxon make it extremely vulnerable to random events and/or reduction of reproductive vigor (59 FR 10305; Service 1996a; HINHP Database 2000).

Vigna o-wahuensis (NCN).

Vigna o-wahuensis, a member of the pea family (Fabaceae), is a slender twining short-lived perennial herb with fuzzy stems. Each leaf is made up of three leaflets which vary in shape from round to linear, and are sparsely or moderately covered with coarse hairs. Flowers, in clusters of one to four, have thin, translucent, pale yellow or greenish-yellow petals. The two lowermost petals are fused and appear distinctly beaked. The sparsely hairy calyx has asymmetrical lobes. The fruits are long slender pods that may or may not be slightly inflated and contain 7 to 15 gray to black seeds. This species

differs from others in the genus by its thin yellowish petals, sparsely hairy calyx, and thin pods which may or may not be slightly inflated (Geesink *et al.* 1999).

Information on the life history of this plant, reproductive cycles, longevity, specific environmental requirements, and limiting factors is unknown (Service 1999).

Historically, *Vigna o-wahuensis* was known from Niihau, Oahu, Maui, Molokai, Lanai, Kahoolawe, and the island of Hawaii. Currently, *Vigna o-wahuensis* is known from the islands of Molokai, Lanai, Kahoolawe, Maui, and island of Hawaii. There are no currently known populations on Niihau or Oahu. On the island of Hawaii, one population with 10 individuals occurs on privately owned land at Nohona O Hae (59 FR 56333; HINHP Database 2000; GDSI 2000).

On the island of Hawaii, *Vigna o-wahuensis* occurs in *Dodonaea viscosa* lowland dry shrubland at elevations between 351 and 2,274 m (1,150 to 7,460 ft). Associated native plant species include *Chenopodium oahuense*, *Dodonaea viscosa*, *Osteomeles anthyllidifolia*, *Wikstroemia* sp., (akia) or *Sida fallax* (59 FR 56333; HINHP Database 2000; Service 1999).

The primary threats to *Vigna o-wahuensis* on Hawaii island are competition with various non-native plant species, a risk of extinction due to random environmental events (primarily fire), and/or reduced reproductive vigor due to the small number of existing populations and individuals (Service 1999; 59 FR 56333).

Zanthoxylum hawaiiense (ae).

Zanthoxylum hawaiiense, a long-lived perennial in the rue family (Rutaceae), is a medium-size tree with pale to dark gray bark, and lemon-scented leaves. Alternate leaves are composed of three small triangular-oval to lance-shaped, toothed leaflets with surfaces usually without hairs. *Zanthoxylum hawaiiense* is distinguished from other Hawaiian members of the genus by several characters: three leaflets all of similar size, one joint on lateral leaf stalk, and sickle-shaped fruits with a rounded tip (Stone *et al.* 1999).

Additional information on the life history of this plant, reproductive cycles, longevity, specific environmental requirements, and limiting factors are generally unknown (59 FR 10305; Service 1996a).

Historically, *Zanthoxylum hawaiiense* was known from the islands of Kauai, Molokai, Lanai, the southern and southwestern slopes of Haleakala on Maui, and the island of Hawaii. Currently, *Zanthoxylum hawaiiense* is extant on Kauai, Molokai, Maui, and the island of Hawaii. On the island of Hawaii, the four extant populations with less than 250 individuals are located on State lands and on lands under Federal jurisdiction at Pohakuloa Training Area (59 FR 10305; HINHP Database 2000; GDSI 2000).

On the island of Hawaii, *Zanthoxylum hawaiiense* is found in *Metrosideros polymorpha* dry forest with *Dodonaea viscosa* or *Myoporum sandwicense*, or with *Dubautia linearis* in open *Myoporum-Dodonaea* shrubland on rough aa lava at elevations between 1,204 and 1,756 m (3,950 and 5,760 ft) (HINHP Database 2000; 59 FR 10305; L. Pratt *et al.*, pers. comm. 2001).

The threats to *Zanthoxylum hawaiiense* on the island of Hawaii include browsing, grazing, and trampling by feral goats, pigs and sheep; competition with non-native plant species; habitat degradation and destruction by humans, including military impacts; and extinction from naturally occurring events (primarily fire) and/or from reduced reproductive vigor due to the small number of individuals and populations (59 FR 10305; Service 1996a).

A summary of populations and landownership for the 58 plant species on the island of Hawaii is given in Table 3.

TABLE 3.—SUMMARY OF POPULATIONS OCCURRING ON THE ISLAND OF HAWAII, AND LANDOWNERSHIP FOR 58 SPECIES REPORTED FROM THE ISLAND OF HAWAII

Species	Number of current populations	Landownership/Jurisdiction		
		Federal	State	Private
Achyranthes mutica	1			X
Adenophorus periens	13	X[1]	X	X
Argyroxiphium kauense	3	X[1]	X	X
Asplenium fragile var. insulare	17	X[1 2]	X	X
Bonamia menziesii	1			X
Cenchrus agrimonioides	0.			
Clermontia drepanomorpha	1		X	X
Clermontia lindseyana	17	X[3]	X	
Clermontia peleana	0.			
Clermontia pyrularia	1	X[1]	X	
Colubrina oppositifolia	8		X	X
Cyanea copelandii ssp. *copelandii*	0.			
Ctenitis squamigera	0.			
Cyanea hamatiflora ssp. *carlsonii*	3	X[3]	X	
Cyanea platyphylla	9		X	X
Cyanea shipmanii	5	X[3]	X	X
Cyanea stictophylla	5		X	X
Cyrtandra giffardii	7	X[1]	X	X
Cyrtandra tintinnabula	6		X	X
Delissea undulata	1		X	
Diellia erecta	3		X	
Flueggea neowawraea	4		X	X
Gouania vitifolia	1		X	
Hedyotis cookiana	0.			
Hedyotis coriacea	11	X[2]		
Hibiscadelphus giffardianus	1 (planted)	X[1]		
Hibiscadelphus hualalaiensis	2 (planted)		X	
Hibiscus brackenridgei	4		X	X
Ischaemum byrone	5	X[1]	X	X

TABLE 3.—SUMMARY OF POPULATIONS OCCURRING ON THE ISLAND OF HAWAII, AND LANDOWNERSHIP FOR 58 SPECIES REPORTED FROM THE ISLAND OF HAWAII—Continued

Species	Number of current populations	Landownership/Jurisdiction		
		Federal	State	Private
Isodendrion hosakae	3			X
Isodendrion pyrifolium	1		X	
Mariscus fauriei	2		X	X
Mariscus pennatiformis	0.			
Melicope zahlbruckneri	2	X[1]	X	
Neraudia ovata	3	X[1 2]	X	X
Nothocestrum breviflorum	10	X[1 3]	X	X
Ochrosia kilaueaensis	0.			
Phlegmariurus mannii	0.			
Phyllostegia parviflora	0.			
Phyllostegia racemosa	7	X[1 3]	X	X
Phyllostegia velutina	5	X[3]	X	X
Phyllostegia warshaueri	7		X	X
Plantago hawaiensis	8	X[1]	X	
Plantago princeps	0.			
Pleomele hawaiiensis	8	X[1]	X	X
Portulaca sclerocarpa	19	X[1 2]	X	X
Pritchardia affinis	unknown.			
Pritchardia schattaueri	1			X
Sesbania tomentosa	11	X[1 4]	X	
Sicyos alba	4	X[1]	X	
Silene hawaiiensis	23	X[1 2]	X	X
Silene lanceolata	10	X[2]		
Solanum incompletum	1	X[2]		
Spermolepis hawaiiensis	4	X[1 2]	X	
Tetramolopium arenarium	2	X[2]		
Vigna o-wahuensis	1			X
Zanthoxylum dipetalum var. *tomentosum*	1		X	
Zanthoxylum hawaiiense	4	X[2]	X	

[1] Hawaii Volcanoes National Park.
[2] Pohakuloa Training Area.
[3] Hakalau Forest National Wildlife Refuge.
[4] Government Services Administration.

Previous Federal Action

Federal action on these plants began as a result of Section 12 of the Act, which directed the Secretary of the Smithsonian Institution to prepare a report on plants considered to be endangered, threatened, or extinct in the United States. This report, designated as House Document No. 94–51, was presented to Congress on January 9, 1975. In that document, *Adenophorus periens, Argyroxiphium kauense, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii* (as *Cyanea carlsonii), Cyanea platyphylla* (as *Cyanea bryanii), Cyanea shipmanii, Flueggea neowawraea* (as *Drypetes phyllanthoides), Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei* (as *Hibiscus brackenridgei* var. *brackenridgei,* var. *mokuleianus,* and var. ''from Hawaii''), *Ischaemum byrone, Melicope zahlbruckneri* (as *Pelea zahlbruckneri), Neraudia ovata, Nothocestrum breviflorum* (as *Nothocestrum breviflorum* var. *breviflorum), Portulaca sclerocarpa, Sesbania tomentosa* (as *Sesbania hobdyi* and *Sesbania tomentosa* var. *tomentosa), Silene lanceolata, Solanum incompletum* (as *Solanum haleakalense* and *Solanum incompletum* var. *glabratum,* var. *incompletum,* and var. *mauiensis), Vigna o-wahuensis* (as *Vigna sandwicensis* var. *heterophylla* and var. *sandwicensis*), and *Zanthoxylum hawaiiense* (as *Zanthoxylum hawaiiense* var. *citriodora*) were considered endangered; *Cyrtandra giffardii, Diellia erecta, Silene hawaiiensis* (as *Silene hawaiiensis* var. *hawaiiensis), Zanthoxylum dipetalum* var. *tomentosum,* and *Zanthoxylum hawaiiense* (as *Zanthoxylum hawaiiense* var. *hawaiiense* and var. *velutinosum*) were considered threatened; and, *Asplenium fragile* var. *insulare* (as *Asplenium fragile*), *Clermontia pyrularia, Delissea undulata* (as *Delissea undulata* var. *argutidentata* and var. *undulata), Gouania vitifolia, Hedyotis coriacea, Isodendrion hosakae, Isodendrion pyrifolium, Nothocestrum breviflorum* (as *Nothocestrum breviflorum* var. *longipes*), and *Tetramolopium arenarium* (as *Tetramolopium arenarium* var. *arenarium,* var. *confertum,* and var. *dentatum*) were considered to be extinct. On July 1, 1975, we published a notice in the **Federal Register** (40 FR 27823) of our acceptance of the Smithsonian report as a petition within the context of Section 4(c)(2) (now Section 4(b)(3)) of the Act, and gave notice of our intention to review the status of the plant taxa named therein. As a result of that review, on June 16, 1976, we published a proposed rule in the **Federal Register** (41 FR 24523) to determine endangered status pursuant to Section 4 of the Act for approximately 1,700 vascular plant taxa, including all of the above taxa except for *Cyrtandra giffardii* and *Silene hawaiiensis.* The list of 1,700 plant taxa was assembled on the basis of comments and data received by the Smithsonian Institution and the Service in response to House Document No. 94–51 and the July 1, 1975, **Federal Register** publication.

General comments received in response to the 1976 proposal are summarized in an April 26, 1978, **Federal Register** publication (43 FR

17909). In 1978, amendments to the Act required that all proposals over 2 years old be withdrawn. A 1-year grace period was given to proposals already over 2 years old. On December 10, 1979, we published a notice in the **Federal Register** (44 FR 70796) withdrawing the portion of the June 16, 1976, proposal that had not been made final, along with four other proposals that had expired. We published updated notices of review for plants on December 15, 1980 (45 FR 82479), September 27, 1985 (50 FR 39525), February 21, 1990 (55 FR 6183), September 30, 1993 (58 FR 51144), and February 28, 1996 (61 FR 7596). A summary of the status categories for these 58 plant species in the 1980 through1996 notices of review can be found in Table 4(a). We listed the 58 species as endangered or threatened between 1991 and 1996. A summary of the listing actions can be found in Table 4(b).

TABLE 4(a).—SUMMARY OF CANDIDACY STATUS FOR 58 PLANT SPECIES FROM THE ISLAND OF HAWAII

Species	*Federal Register* Notice of Review			
	1980	1985	1990	1993
Achyranthes mutica				
Adenophorus periens	C1	C1	C1	
Argyroxiphium kauense	C1	C1	C1	
Asplenium fragile var. *insulare*	C1*	C1*	C1	
Bonamia menziesii	C1	C1	C1	
Cenchrus agrimonioides				
Clermontia drepanomorpha	C1	C1	C1	C2
Clermontia lindseyana	C1	C1	C1	
Clermontia peleana	3C	3C	C1	
Clermontia pyrularia	C1	C1	C1	
Colubrina oppositifolia	C1	C1	C1	
Cyanea copelandii ssp. *copelandii*			C1	
Cyanea hamatiflora ssp. *carlsonii*	C1	C1	C1	
Cyanea platyphylla	C1	C1	C1	
Cyanea shipmanii	C1	C1	C1	
Cyanea stictophylla	C1	C1	C1	
Cyrtandra giffardii	C2	C2	C1	
Cyrtandra tintinnabula			C1	
Delissea undulata	C1	C1*	C1*	C2*
Diellia erecta	C1	C1	C1	
Flueggea neowawraea	C1	C1	C1	
Gouania vitifolia	C1*	C1*	C1*	
Hedyotis cookiana	3A	3A	C1	
Hedyotis coriacea	C1	C1	C1	
Hibiscadelphus giffardianus	C1	C1	C1	C1
Hibiscadelphus hualalaiensis	C1	C1	C1	C1
Hibiscus brackenridgei	C1	C1	C1	
Ischaemum byrone	C1	C1	C1	
Isodendrion hosakae	C1			
Isodendrion pyrifolium	C1*	C1*	3A	
Mariscus fauriei			C1	
Mariscus pennatiformis		C1	C1	
Melicope zahlbruckneri		C1	C2	C2
Neraudia ovata	C1	C1	C1	C2
Nothocestrum breviflorum	C1	C1	C1	
Ochrosia kilaueaensis		C2	C1	
Phlegmariurus mannii	C1	C1	C1	
Phyllostegia parviflora				
Phyllostegia racemosa			C2	C2
Phyllostegia velutina			C2	C2
Phyllostegia warshaueri			C2	C2
Plantago hawaiensis			C1	
Plantago princeps	C2	C2	C1	
Pleomele hawaiiensis	C1	C1	C1	C2
Portulaca sclerocarpa	C1	C1	C1	
Pritchardia affinis			C1	
Pritchardia schattaueri		C2	C2	C2
Sesbania tomentosa	C1*	C1*	C1	
Sicyos alba			C2	C2
Silene hawaiiensis	C1	C1	C1	
Silene lanceolata	C1	C1	C1	
Solanum incompletum	C1*	C1*	C1	
Spermolepis hawaiiensis			C1	
Tetramolopium arenarium	C1*	C1*	3A	
Vigna o-wahuensis	C1	C1	C1	
Zanthoxylum dipetalum var. *tomentosum*			C2	C2
Zanthoxylum hawaiiense	C1	C1	C1	

Key:
C1: Taxa for which the Service has on file enough sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species.

C1*: Taxa of known vulnerable status in the recent past that may already have become extinct.
C2: Taxa for which there is some evidence of vulnerability, but for which there are not enough data to support listing proposals at this time.
C2*: Taxa of known vulnerable status in the recent past that may already have become extinct.
3A: Taxa for which the Service has persuasive evidence of extinction. If rediscovered, such taxa might acquire high priority for listing.
3C: Taxa that have proven to be more abundant or widespread than previously believed and/or those that are not subject to any identifiable threat.
Federal Register Notice of Review
1980: 45 FR 82479 1990: 55 FR 6183 1996: 61 FR 7596
1985: 50 FR 39525 1993: 58 FR 51144

TABLE 4(b).—SUMMARY OF LISTING ACTIONS FOR 58 PLANT SPECIES FROM THE ISLAND OF HAWAII

Species	Federal status	Proposed Rule		Final Rule		Prudency determination and proposed critical habitat	
		Date	Federal Register	Date	Federal Register	Date	Federal Register
Achyranthes mutica	E	10/02/1995	60 FR 51417	10/10/1996	61 FR 53108	11/07/2000	65 FR 66808.
Adenophorus periens	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	11/07/2000, 12/18/2000, 12/29/2000.	65 FR 66808, 65 FR 82086, 66 FR 83157.
Argyroxiphium kauense	E	08/06/1990	55 FR 31860	04/07/1993	58 FR 18029		
Asplenium fragile var. *insulare*.	E	06/24/1993	58 FR 34231	09/09/1994	59 FR 49025	12/18/2000	65 FR 79192.
Bonamia menziesii	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	11/07/2000, 12/18/2000, 12/27/2000.	65 FR 66808 65 FR 79192, 65 FR 82086.
Cenchrus agrimonioides.	E	10/02/1995	60 FR 51417	10/10/1996	61 FR 53108	12/18/2000	65 FR 79192.
Clermontia drepanomorpha.	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Clermontia lindseyana	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	12/18/2000	65 FR 79192.
Clermontia peleana	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	12/18/2000	65 FR 79192.
Clermontia pyrularia	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Colubrina oppositifolia	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	12/18/2000	65 FR 79192.
Ctenitis squamigera	E	06/24/1993	58 FR 34231	09/09/1994	59 FR 49025	12/18/2000, 12/27/2000, 12/29/2000, 1/28/2002.	65 FR 79192, 65 FR 82086, 66 FR 83157, 67 FR 3940.
Cyanea copelandii ssp *copelandii*.	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Cyanea hamatiflora ssp. *carlsonii*.	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Cyanea platyphylla	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Cyanea shipmanii	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Cyanea stictophylla	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Cyrtandra giffardii	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Cyrtandra tintinnabula	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Delissea undulata	E	06/27/1994	59 FR 32946	10/10/1996	61 FR 53124	11/07/2000	65 FR 66808.
Diellia erecta	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	12/18/2000, 12/29/2000, 1/28/2002.	65 FR 79192, 65 FR 83158, 67 FR 3940.
Flueggea neowawraea	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	11/07/2000, 12/18/2000.	65 FR 66808, 65 FR 79192.
Gouania vitifolia	E	12/14/1992	57 FR 39066	06/27/1994	59 FR 32932		
Hedyotis cookiana	E	10/30/1991	56 FR 5562	02/25/1994	59 FR 09304	11/07/2000	65 FR 66808.
Hedyotis coriacea	E	05/24/1991	56 FR 23842	05/15/1992	57 FR 20787	12/18/2000	65 FR 79192.
Hibiscadelphus giffardianus.	E	09/25/1995	60 FR 4937	10/10/1996	61 FR 53137		
Hibiscadelphus hualalaiensis.	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Hibiscus brackenridgei	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	12/18/2000, 12/27/2000, 1/28/2002.	65 FR 79192, 65 FR 82086, 67 FR 3940.
Ischaemum byrone	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	12/18/2000, 12/29/2000, 1/28/2002.	65 FR 79192, 65 FR 83158, 67 FR 3940.
Isodendrion hosakae	E	10/10/1989	54 FR 41470	01/14/1991	56 FR 1457		
Isodendrion pyrifolium	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Mariscus fauriei	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	12/29/2000	65 FR 83158.
Mariscus pennatiformis	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	12/18/2000, 1/28/2002.	65 FR 79192, 67 FR 3940.
Melicope zahlbruckneri	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Neraudia ovata	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Nothocestrum breviflorum.	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		

TABLE 4(b).—SUMMARY OF LISTING ACTIONS FOR 58 PLANT SPECIES FROM THE ISLAND OF HAWAII—Continued

Species	Federal status	Proposed Rule		Final Rule		Prudency determination and proposed critical habitat	
		Date	Federal Register	Date	Federal Register	Date	Federal Register
Ochrosia kilaueaensis	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Phlegmariurus mannii	E	5/24/1991	56 FR 23842	5/15/1992	57 FR20772	12/18/2000, 1/28/2002.	65 FR 79192, 67 FR 3940.
Phyllostegia parviflora	E	10/02/1995	60 FR 51417	10/10/1996	61 FR 53108		
Phyllostegia racemosa	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Phyllostegia velutina	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Phyllostegia warshaueri	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Plantago hawaiensis	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Plantago princeps	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	11/07/2000, 12/18/2000.	65 FR 66808, 65 FR 79192.
Pleomele hawaiiensis	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Portulaca sclerocarpa	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	12/27/2000	65 FR 82086.
Pritchardia affinis	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10324		
Pritchardia schattaueri	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Sesbania tomentosa	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	11/07/2000, 12/18/2000, 12/29/2000.	65 FR 66808, 65 FR 79192, 65 FR 83158.
Sicyos alba	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Silene hawaiiensis	T	12/17/1992	57 FR 59951	03/04/1994			59 FR 10305
Silene lanceolata	E	09/20/1991	56 FR 47718	10/08/1992	57 FR 46325	12/29/2000, 1/28/2002.	65 FR 83158, 67 FR 3940.
Solanum incompletum	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333		
Spermolepis hawaiiensis.	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	11/07/2000, 2/18/2000, 12/27/2000, 12/29/2000.	65 FR 6680, 65 FR 79192, 65 FR 82086, 65 FR 83158.
Tetramolopium arenarium.	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305		
Vigna o—wahuensis	E	09/14/1993	58 FR 48012	11/10/1994	59 FR 56333	12/18/2000, 12/29/2000, 1/28/2002.	65 FR 79192, 65 FR 83158, 67 FR 3940.
Zanthoxylum dipetalum var. *tomentosum*.	E	09/25/1995	60 FR 49377	10/10/1996	61 FR 53137		
Zanthoxylum hawaiiense.	E	12/17/1992	57 FR 59951	03/04/1994	59 FR 10305	11/07/2000, 12/18/2000, 12/29/2000.	65 FR 66808, 65 FR 79192, 65 FR 83158.

Key: E = Endangered; T = Threatened

Critical Habitat

Section 4 (a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the time the species is determined to be endangered or threatened. Our regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent when one or both of the following situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of threat to the species, or (2) such designation of critical habitat would not be beneficial to the species. At the time each plant was listed, we determined that designation of critical habitat was not prudent because it would not benefit the plant and/or would increase the degree of threat to the species.

The not prudent determinations for the 58 species, along with others, were challenged in *Conservation Council for Hawaii* v. *Babbitt,* 2 F. Supp. 2d 1280 (D. Haw. 1998). On March 9, 1998, the United States District Court for the District of Hawaii, directed us to review the prudency determinations for 245 listed plant species in Hawaii, including the 58 species reported from the island of Hawaii (*Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Cenchrus agrimoiodes, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Ctentis squamigera, Cyanea copelandii* ssp. *copelandii, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis cookiana, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Mariscus pennatiformis, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Ochrosia kilaueaensis, Phlegmariurus mannii, Phyllostegia parviflora, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Plantago princeps, Pleomele hawaiiensis, Portulaca sclerocarpa, Pritcharida affinis, Pritcharida schattaueri, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum var. tomentosum,* and *Zanthoxylum hawaiiense*). Among other things, the

court held that in most cases we did not sufficiently demonstrate that the species are threatened by human activity or that such threats would increase with the designation of critical habitat. The court also held that we failed to balance any risks of designating critical habitat against any benefits (*id.* at 1283–85).

Regarding our determination that designating critical habitat would have no additional benefits to the species above and beyond those already provided through the section 7 consultation requirement of the Act, the court ruled that we failed to consider the specific effect of the consultation requirement on each species (*id.* at 1286–88). In addition, the court stated that we did not consider benefits outside of the consultation requirements. In the court's view, these potential benefits include substantive and procedural protections. The court held that, substantively, designation establishes a ''uniform protection plan'' prior to consultation and indicates where compliance with section 7 of the Act is required. Procedurally, the court stated that the designation of critical habitat educates the public and State and local governments and affords them an opportunity to participate in the designation (*id.* at 1288). The court also stated that private lands may not be excluded from critical habitat designation even though section 7 requirements apply only to Federal agencies. In addition to the potential benefit of informing the public, and State and local governments of the listing and of the areas that are essential to the species' conservation, the court found that there may be Federal activity on private property in the future, even though no such activity may be occurring there at the present (*id.* at 1285–88).

On August 10, 1998, the court ordered us to publish proposed critical habitat designations or non-designations for at least 100 species by November 30, 2000, and to publish proposed designations or non-designations for the remaining 145 species by April 30, 2002 (24 F. Supp. 2d 1074).

On November 30, 1998, we published a notice in the **Federal Register** requesting public comments on our reevaluation of whether designation of critical habitat is prudent for the 245 Hawaiian plants at issue (63 FR 65805). The comment period closed on March 1, 1999, and was reopened from March 24, 1999, to May 24, 1999 (64 FR 14209). We received more than 100 responses from individuals, non-profit organizations, the DOFAW, county governments, and Federal agencies (U.S. Department of Defense-Army, Navy, Air Force). Only a few responses offered information on the status of individual plant species or on current management actions for one or more of the 245 Hawaiian plants. While some of the respondents expressed support for the designation of critical habitat for 245 Hawaiian plants, more than 80 percent opposed the designation of critical habitat for these plants. In general, these respondents opposed designation because they believed it will cause economic hardship, discourage cooperative projects, polarize relationships with hunters, or potentially increase trespass or vandalism on private lands. In addition, commenters also cited a lack of information on the biological and ecological needs of these plants which, they suggested, may lead to designation based on guesswork. The respondents who supported the designation of critical habitat cited that designation would provide a uniform protection plan for the Hawaiian Islands; promote funding for management of these plants; educate the public and State government; and protect partnerships with landowners and build trust.

On September 7, 2000, we mailed letters to over 1,200 landowners on the island of Hawaii requesting any information considered germane to the management of any of the 58 plants on their property, and containing a copy of the November 30, 1998, **Federal Register** notice, a map showing the general locations of the species that may be on their property, and a handout containing general information on critical habitat. We received 300 written responses to our landowner mailing with varying types of information on their current land management activities. These responses included information on the following: control of human access, ungulate control, fencing, hunting, weeding, rat control, scientific research, fire control, and propagation and/or planting of native plants. A few respondents expressed support for the designation of critical habitat. We held three open houses on the island of Hawaii, at Yano Hall in Captain Cook, the Waimea Civic Center in Waimea, and the State Building in Hilo, on August 1 to 3, 2000, respectively, to meet one-on-one with local landowners and other interested members of the public. A total of 84 people attended the three open houses. In addition, we met with Hawaii County Division of Forestry and Wildlife staff and discussed their management activities on the island.

On November 7, 2000, we published the first of the court-ordered prudency determinations and proposed critical habitat designations or non-designations for 76 Kauai and Niihau plants (65 FR 66808). The prudency determinations and proposed critical habitat designations for Maui and Kahoolawe plants were published on December 18, 2000 (65 FR 79192), for Lanai plants on December 27, 2000 (65 FR 82086) and for Molokai plants on December 29, 2000 (65 FR 83157). All of these proposed rules had been sent to the **Federal Register** by or on November 30, 2000, as required by the court's order.

On October 3, 2001, we submitted a joint stipulation with Earth Justice Legal Defense Fund requesting an extension of the court order for the final rules to designate critical habitat for plants from Kauai and Niihau (July 30, 2002), Maui and Kahoolawe (August 23, 2002), Lanai (September 16, 2002), and Molokai (October 16, 2002), citing the need to revise the proposals to incorporate or address new information and comments received during the comment periods. The joint stipulation was approved and ordered by the court on October 5, 2001. We published revised critical habitat proposals on January 28, 2002 (Kauai and Niihau, 67 FR 3940), March 4, 2002 (Lanai, 67 FR 9806), April 3, 2002 (Maui and Kahoolawe, 67 FR 15856), and April 5, 2002 (Molokai, 67 FR 16492). In those proposals we determined that critical habitat was prudent for 31 species (*Achyranthes mutica, Adenophorus periens, Asplenium fragile* var. *insulare, Bonamia menziesii, Cenchrus agrimonioides, Clermontia lindseyana, Clermontia peleana, Colubrina oppositifolia, Ctenitis squamigera, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis cookiana, Hedyotis coriacea, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion pyrifolium, Mariscus fauriei, Mariscus pennatiformis, Phlegmariurus mannii, Phyllostegia parviflora, Plantago princeps, Portulaca sclerocarpa, Sesbania tomentosa, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, and Zanthoxylum hawaiiense*) that are reported from the island of Hawaii as well as on Kauai, Niihau, Maui, Kahoolawe, Lanai, and/or Molokai.

The prudency determinations and proposed critical habitat designations for plants from the Northwestern Hawaiian Islands were published on May 14, 2002. Publication of this proposal for plants from the island of Hawaii is consistent with the August 10, 1998, the court order.

Critical Habitat

Critical habitat is defined in section 3 of the Act as—(i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. ''Conservation'' means the use of all methods and procedures that are necessary to bring an endangered or a threatened species to the point at which listing under the Act is no longer necessary.

Critical habitat receives protection under section 7 of the Act through the prohibition against destruction or adverse modification of critical habitat with regard to actions carried out, funded, or authorized by a Federal agency. Section 7 also requires conferences on Federal actions that are likely to result in the destruction or adverse modification of proposed critical habitat. Aside from the added protection that may be provided under section 7, the Act does not provide other forms of protection to lands designated as critical habitat. Because consultation under section 7 of the Act does not apply to activities on private or other non-Federal lands that do not involve a Federal nexus, critical habitat designation would not afford any additional regulatory protections under the Act.

Critical habitat also provides non-regulatory benefits to the species by informing the public and private sectors of areas that are important for species recovery and where conservation actions would be most effective. Designation of critical habitat can help focus conservation activities for a listed species by identifying areas that contain the physical and biological features that are essential for the conservation of that species, and can alert the public as well as land-managing agencies to the importance of those areas. Critical habitat also identifies areas that may require special management considerations or protection, and may help provide protection to areas where significant threats to the species have been identified to help to avoid accidental damage to such areas.

In order to be included in a critical habitat designation, the habitat must first be ''essential to the conservation of the species.'' Critical habitat designations identify, to the extent known and using the best scientific and commercial data available, habitat areas that provide at least one of the physical or biological features essential to the conservation of the species (primary constituent elements, as defined at 50 CFR 424.12(b)). Section 3(5)(C) of the Act states that not all areas that can be occupied by a species should be designated as critical habitat unless the Secretary determines that such areas are essential to the conservation of the species. Our regulations (50 CFR 424.12(e)) also state that, ''The Secretary shall designate as critical habitat areas outside the geographic area presently occupied by the species only when a designation limited to its present range would be inadequate to ensure the conservation of the species.''

Section 4(b)(2) of the Act requires that we take into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. We may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

Our Policy on Information Standards Under the Endangered Species Act, published on July 1, 1994 (59 FR 34271), provides criteria, establishes procedures, and provides guidance to ensure that decisions made by the Service represent the best scientific and commercial data available. It requires that our biologists, to the extent consistent with the Act and with the use of the best scientific and commercial data available, use primary and original sources of information as the basis for recommendations to designate critical habitat. When determining which areas are critical habitat, a primary source of information should be the listing rule for the species. Additional information may be obtained from a recovery plan, articles in peer-reviewed journals, conservation plans developed by States and counties, scientific status surveys and studies, and biological assessments or other unpublished materials.

Section 4 of the Act requires that we designate critical habitat based on what we know at the time of the designation. Habitat is often dynamic, and species may move from one area to another over time. Furthermore, we recognize that designation of critical habitat may not include all of the habitat areas that may eventually be determined to be necessary for the recovery of the species. For these reasons, critical habitat designations do not signal that habitat outside the designation is unimportant or may not be required for recovery. Areas outside the critical habitat designation will continue to be subject to conservation actions that may be implemented under section 7(a)(1) of the Act and to the regulatory protections afforded by the section 7(a)(2) jeopardy standard and the section 9 prohibitions, as determined on the basis of the best available information at the time of the action. Federally funded or assisted projects affecting listed species outside their designated critical habitat areas may still result in jeopardy findings in some cases. Similarly, critical habitat designations made on the basis of the best available information at the time of designation will not control the direction and substance of future recovery plans, HCPs, or other species conservation planning efforts if new information available to these planning efforts calls for a different outcome.

A. Prudency Redeterminations

In other proposed rules we determined that designation of critical habitat was prudent for 31 species that are reported from the island of Hawaii as well as from Kauai, Niihau, Maui, Kahoolawe, Lanai, and/or Molokai. These 31 plants are: *Achyranthes mutica, Adenophorus periens, Asplenium fragile* var. *insulare, Bonamia menziesii, Cenchrus agrimonioides, Clermontia lindseyana, Clermontia peleana, Colubrina oppositifolia, Ctenitis squamigera, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis cookiana, Hedyotis coriacea, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion pyrifolium, Mariscus fauriei, Mariscus pennatiformis, Phlegmariurus mannii, Phyllostegia parviflora, Plantago princeps, Portulaca sclerocarpa, Sesbania tomentosa, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, and Zanthoxylum hawaiiense.* No change is made to these 31 proposed prudency determinations and they are hereby incorporated into this proposal (65 FR 66808, 65 FR 79192, 65 FR 82086, 65 FR 83158, 67 FR 3940, 67 FR 9806, 67 FR 15856, 67 FR 16492).

To determine whether critical habitat would be prudent for each of the 27 species (*Argyroxiphium kauense, Clermontia drepanomorpha, Clermontia pyrularia, Cyanea copelandii* ssp. *copelandii*, *Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Hibiscadelphus giffardianus, Hibiscadelphus*

hualalaiensis, Isodendrion hosakae, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Ochrosia kilaueaensis, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiiensis, Pleomele hawaiiensis, Pritchardia affinis, Pritchardia schattaueri, Sicyos alba, Silene hawaiiensis, and *Zanthoxylum dipetalum* var. *tomentosum*) for which prudency determinations have not been made previously, we analyzed the potential threats and benefits for each species in accordance with the court's order. These 27 plants were listed as endangered species under the Endangered Species Act of 1973, as amended (Act) between 1991 and 1996. At the time each plant was listed, we determined that designation of critical habitat was not prudent because designation would increase the degree of threat to the species and/or would not benefit the plant. We have examined the evidence currently available for each of these taxa and have found specific evidence of vandalism, disturbance, and/or the threat of unrestricted collection for two species of *Pritchardia*, the native palm. At the time of listing, we determined that designation of critical habitat was not prudent for *Pritchardia affinis* and *P. schattaueri* because it would increase the degree of threat from vandalism or collecting, and would provide no benefit (59 FR 10305; 61 FR 53137). Since publication of the listing rule, we learned of specific instances of vandalism, collection, and commercial trade involving these two species of *Pritchardia*. In the 1990s, seeds of *P. schattaueri* were removed from two of the three locations of this species known at that time (Nick Agorastos, DOFAW, pers. comm. 2000; L. Perry, pers. comm. 2000). Recently we received information on the commercial trade in palms conducted through the internet (Grant Canterbury, Service, *in litt.* 2000). Several nurseries advertise and sell seedlings and young plants, including 13 species of Hawaiian *Pritchardia*. Seven of these species are federally protected, including *P. affinis* and *P. schattaueri* . In light of this information, we believe that designation of critical habitat would likely increase the threat from vandalism or collection to these two species of *Pritchardia* on the island of Hawaii. First, these plants are easy to identify, and second, they are attractive to collectors of rare palms either for their personal use or to trade or sell for personal gain (Johnson 1996). We believe that the evidence shows that these species of palm may be attractive to such collectors. The final listing rules for these two species contained only general information on their distribution, but the publication of precise maps and descriptions of critical habitat in the **Federal Register** would make these species more vulnerable to incidents of vandalism or collection, and, therefore, contribute to the decline of these species and make recovery more difficult (59 FR 10305; 61 FR 53137).

In addition, we believe that designation would not provide significant benefits that would outweigh these increased risks. First, *Pritchardia affinis* and *P. schattaueri* do not occur on Federal lands. *Pritchardia schattaueri* is reported on privately owned land that is zoned for agriculture, and two of the approximately 12 individuals have been fenced. In addition, the privately owned land is currently farmed, with 10 of the plants located in pasture and two located in macadamia nut orchards, and is unlikely to be developed. *Pritchardia affinis* occurs on State and privately owned lands that are zoned for conservation and agriculture. Since there does not appear to be any actions in the future that would involve a Federal agency, designation of critical habitat would not provide any additional protection to these species that they do not already have through listing alone. If however in the future any Federal involvement did occur, such as through the permitting process or funding by the Department of Agriculture, the U.S. Department of the Interior, the Corps through section 404 of the Clean Water Act, the U.S. Federal Department of Housing and Urban Development or the Federal Highway Administration, the actions would be subject to consultation under Section 7 of the Act.

We acknowledge that critical habitat designation, in some situations, may provide some value to the species, for example, by identifying areas important for conservation and calling attention to those areas in need of special protection. However, for these two species, we believe that the benefits of designating critical habitat do not outweigh the potential increased threats from vandalism or collection. Given all of the above considerations, we propose that designation of critical habitat for *Pritchardia affinis* and *P. schattaueri* is not prudent.

To determine whether critical habitat would be prudent for *Cyanea copelandii* ssp. *copelandii* and *Ochrosia kilaueaensis*, two species endemic to the island of Hawaii and which are no longer extant in the wild, we analyzed the potential threats and benefits for these species in accordance with the court's order. These plants were listed as endangered species under the Endangered Species Act of 1973, as amended (Act) in 1994. At the time *C. copelandii* ssp. *copelandii* and *O. kilaueaensis* were listed, we determined that designation of critical habitat was not prudent because designation would increase the degree of threat to these species and/or would not benefit these plants. *Cyanea copelandii* ssp. *copelandii* was last seen in the wild in 1957 in the Glenwood area. *Ochrosia kilaueaensis* was last observed in the wild in 1927, in an area that is now part of Hawaii Volcanoes National Park. Neither of these two species is known to be in storage or under propagation. Given these circumstances, we determine that designation of critical habitat would be of no benefit to these species. If these species are rediscovered we may revise this proposal to incorporate or address new information as new data becomes available (See 16 U.S.C. 1532 (5) (B); 50 CFR 424.13(f)).

We have examined the evidence available for the other 23 taxa and have not, at this time, found specific evidence of taking, vandalism, collection or trade of these taxa or of similar species. Consequently, while we remain concerned that these activities could potentially threaten these 23 plant species in the future, consistent with applicable regulations (50 CFR 424.12(a)(1)(i)) and the court's discussion of these regulations, we do not find that any of these species are currently threatened by taking or other human activity, which would be exacerbated by the designation of critical habitat. In the absence of finding that critical habitat would increase threats to a species, if there are any benefits to critical habitat designation, then a prudent finding is warranted. The potential benefits include (1) triggering section 7 consultation in new areas where it would not otherwise occur because, for example, it is or has become unoccupied or the occupancy is in question; (2) focusing conservation activities on the most essential areas; (3) providing educational benefits to State or county governments or private entities; and (4) preventing people from causing inadvertent harm to the species. In the case of these 23 species there would be some benefits to critical habitat. The primary regulatory effect of critical habitat is the section 7 requirement that Federal agencies refrain from taking any action that destroys or adversely affects critical habitat. Thirteen of these 23 species are reported from federally owned lands or

lands under Federal jurisdiction on the island of Hawaii (*Argyroxiphium kauense, Cyanea shipmanii, Cyrtandra giffardii, Hibiscadelphus giffardianus, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Plantago hawaiiensis, Pleomele hawaiiensis, Sicyos alba*, and *Silene hawaiiensis*) (see Table 3), where actions would be subject to section 7 consultation. While many of the species are located exclusively on non-Federal lands with limited Federal activities, there could be Federal actions affecting these lands in the future. While a critical habitat designation for habitat currently occupied by these species would not likely change the section 7 consultation outcome, since an action that destroys or adversely modifies such critical habitat would also be likely to result in jeopardy to the species, there may be instances where section 7 consultation would be triggered only if critical habitat were designated. There may also be some educational or informational benefits to the designation of critical habitat. Educational benefits include the notification of landowner(s), land managers, and the general public of the importance of protecting the habitat of these species and dissemination of information regarding their essential habitat requirements. Therefore, we propose that designation of critical habitat is prudent for 23 plant species: *Argyroxiphium kauense, Clermontia drepanomorpha, Clermontia pyrularia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Isodendrion hosakae, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiiensis, Pleomele hawaiiensis, Sicyos alba, Silene hawaiiensis*, and *Zanthoxylum dipetalum* var. *tomentosum*.

B. Methods

As required by the Act (section 4(b)(2)) and regulations at 50 CFR 424.12, we used the best scientific data available to determine areas that are essential to conserve *Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Cenchrus agrimonioides, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Ctenitis squamigena, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis cookiana, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Mariscus pennatiformis, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phlegmariurus mannii, Phyllostegia parviflora, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Plantago princeps, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum* var. *tomentosum*, and *Zanthoxylum hawaiiense*. This information included the known locations, site-specific species information from the HINHP database and our own rare plant database; species information from the CPC's rare plant monitoring database housed at the University of Hawaii's Lyon Arboretum; island-wide GIS coverages,(*e.g.* vegetation, soils, annual rainfall, elevation contours, land ownership); the final listing rules for these 54 species; recent biological surveys and reports; our recovery plans for these 54 species; information received in response to outreach materials and requests for species and management information we sent to all landowners, land managers, and interested parties on the island of Hawaii; discussions with botanical experts; and recommendations from the Hawaii Pacific Plants Recovery Coordinating Committee (HPPRCC) (see also the discussion below) (Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999; HPPRCC 1998; HINHP Database 2000, CPC *in litt.* 1999; S. Perlman, pers. comm. 2000, R. Hobdy, pers. comm. 2000, L. Pratt *et al.,* pers. comm. 2001).

In 1994, the HPPRCC initiated an effort to identify and map habitat it believed to be important for the recovery of 282 endangered and threatened Hawaiian plant species. The HPPRCC identified these areas on most of the islands in the Hawaiian chain, and in 1999 we published them in our *Recovery Plan for the Multi-Island Plants* (Service 1999). The HPPRCC expects there will be subsequent efforts to further refine the locations of important habitat areas and that new survey information or research may also lead to additional refinement of identifying and mapping of habitat important for the recovery of these species.

The HPPRCC identified essential habitat areas for all listed, proposed, and candidate plants and evaluated species of concern to determine if essential habitat areas would provide for their habitat needs. However, the HPPRCC's mapping of habitat is distinct from the regulatory designation of critical habitat as defined by the Act. More data has been collected since the recommendations made by the HPPRCC in 1998. Much of the area that was identified by the HPPRCC as inadequately surveyed has now been surveyed in some way. New location data for many species has been gathered. Also, the HPPRCC identified areas as essential based on species clusters (areas that included listed species as well as candidate species and species of concern) while we have only delineated areas that are essential for the conservation of the 47 listed species at issue. As a result, the proposed critical habitat designations in this proposed rule include not only some habitat that was identified as essential in the 1998 recommendations but also habitat that was not identified as essential in those recommendations.

C. Primary Constituent Elements

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, we are required to base critical habitat determinations on the best scientific and commercial data available and to consider those physical and biological features (primary constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection. Such requirements include, but are not limited to, space for individual and population growth, and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring, germination, or seed dispersal; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

As described in the discussions for each of the 47 species (*Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *Insulare, Bonamia menziesii, Clermontia drepanomorpha, Clermontia*

lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum var. tomentosum, and Zanthoxylum hawaiiense*) for which we are proposing critical habitat, we are proposing to define the primary constituent elements on the basis of the habitat features of the areas in which the plant species are reported from, as described by the type of plant community, associated native plant species, locale information (*e.g.,* steep rocky cliffs, talus slopes, stream banks), and elevation. The habitat features provide the ecological components required by the plant. The type of plant community and associated native plant species indicates specific microclimate conditions, retention and availability of water in the soil, soil microorganism community, and nutrient cycling and availability. The locale indicates information on soil type, elevation, rainfall regime, and temperature. Elevation indicates information on daily and seasonal temperature and sun intensity. Therefore, the descriptions of the physical elements of the locations of each of these species, including habitat type, plant communities associated with the species, location, and elevation, as described in the Supplementary Information: *Discussion of the Plant Taxa* section above, constitute the primary constituent elements for these species on the island of Hawaii.

We are unable to identify the primary constituent elements for *Cenchrus agrimonioides, Ctenitis squamigera, Hedyotis cookiana, Mariscus pennatiformis, Phlegmariurus mannii, Phyllostegia parviflora,* and *Plantago princeps,* which no longer occur on the island of Hawaii, because information on these features for these species on the island is not available at this time. Therefore, we are not able to identify the specific areas outside the geographic areas occupied by these species at the time of their listing (unoccupied habitat) that are essential for the conservation of *Cenchrus agrimonioides, Ctenitis squamigera, Hedyotis cookiana, Mariscus pennatiformis, Phlegmariurus mannii, Phyllostegia parviflora,* and *Plantago princeps* on the island of Hawaii.

All areas proposed as critical habitat are within the historical range of one or more of the 47 species at issue and contain one or more of the physical or biological features (primary constituent elements) essential for the conservation of one or more of the species.

D. Criteria Used to Identify Critical Habitat

The lack of detailed scientific data on the life history of these plant species makes it impossible for us to develop a robust quantitative model (*e.g.,* population viability analysis) to identify the optimal number, size, and location of critical habitat units to achieve recovery (Beissinger and Westphal 1998; Burgman *et al.* 2001; Ginzburg *et al.* 1990; Karieva and Wennergren 1995; Menges 1990; Murphy *et al.* 1990; Taylor 1995). At this time, and consistent with the listing of these species and their recovery plans, the best available information leads us to conclude that the current size and distribution of the extant populations are not sufficient to expect a reasonable probability of long-term survival and recovery of these plant species. Therefore, we used the best available information, including expert scientific opinion to identify potentially suitable habitat within the known historic range of each species.

We considered several factors in the selection and proposal of specific boundaries for critical habitat for these 47 species. For each of these species, the overall recovery strategy outlined in the approved recovery plans includes the following components: (1) Stabilization of existing wild populations, (2) protection and management of habitat, (3) enhancement of existing small populations and reestablishment of new populations within historic range, and (4) research on species' biology and ecology ((Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999). Thus, the long-term recovery of these species is dependent upon the protection of existing population sites and potentially suitable unoccupied habitat within historic range.

The overall recovery goal stated in the recovery plans for each of these species includes the establishment of 8 to 10 populations with a minimum of 100 mature individuals per population for long-lived perennials, 300 mature individuals per population for short-lived perennials, and 500 mature individuals per population for annuals. There are some specific exceptions to this general recovery goal of 8 to 10 populations for species that are believed to have occurred historically as one, large, scattered population (see discussion below on *Argyroxiphium kauense*), and the proposed critical habitat designations reflect this exception for these species. To be considered recovered each population of a species endemic to the island of Hawaii should occur on the island to which it is endemic, and likewise the populations of a multi-island species should be distributed among the islands of its known historic range (Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999). A population, for the purposes of this discussion and as defined in the recovery plans for these species, is defined as a unit containing 100, 300, or 500 mature individuals, depending on whether the species is a long-lived perennial, short-lived perennial, or annual, in which the individuals could be regularly cross-pollinated and are influenced by the same small-scale events (such as landslides).

For *Argyroxiphium kauense,* the recovery objective is more than 100,000 individuals spread over the historic range of the species because the best available information indicates this number of individuals is necessary to preserve the majority of the existing genetic diversity and to protect against extinction due to catastrophic events, especially lava flows (Service 1996c). *Argyroxiphium kauense* is monocarpic (only flowering once before dying), requires years to decades to mature, and must be cross-pollinated from a genetically different plant to produce viable seeds (Powell 1992, Carr *et al.* 1986). All of these characteristics indicate the need for more individuals in order to maintain a genetically diverse, viable population (Falk *et al.* 1996).

By adopting the specific recovery objectives enumerated above, the adverse effects of genetic inbreeding and random environmental events and catastrophes, such as landslides, hurricanes or tsunamis, that could destroy a large percentage of the species at any one time may be reduced (Menges 1990, Podolsky 2001). These recovery objectives were initially

developed by the HPPRCC and are found in all of the recovery plans for these species. While they are expected to be further refined as more information on the population biology of each species becomes available, the justification for these objectives is found in the current conservation biology literature addressing the conservation of rare and endangered plants and animals (Beissinger and Westphal 1998; Burgman *et al.* 2001; Falk *et al.* 1996; Ginzburg *et al.* 1990; Hendrix and Kyhl 2000; Karieva and Wennergren 1995; Luijten *et al.* 2000; Meffe and Carroll 1997; Podolsky 2001; Menges 1990; Murphy *et al.* 1990; Quintana-Ascencio and Menges 1996; Taylor 1995; Tear *et al.* 1995; Wolf and Harrison 2001). The overall goal of recovery in the short-term is a successful population that can carry on basic life-history processes, such as establishment, reproduction, and dispersal, at a level where the probability of extinction is low. In the long-term, the species and its populations should be at a reduced risk of extinction and be adaptable to environmental change through evolution and migration.

The long-term objectives, as reviewed by Pavlik (1996), require from 50 to 2,500 individuals per population, based largely on research and theoretical modeling on endangered animals, since much less research has been done on endangered plants. Many aspects of species life history are typically considered to determine guidelines for species interim stability and recovery, including longevity, breeding system, growth form, fecundity, ramet (a plant that is an independent member of a clone) production, survivorship, seed duration, environmental variation, and successional stage of the habitat. Hawaiian species are poorly studied, and the only one of the afore-mentioned characteristics that can be uniformly applied to all Hawaiian plant species is longevity (*i.e.,* long-lived perennial, short-lived perennial, and annual). In general, long-lived woody perennial species would be expected to be viable at population levels of 50 to 250 individuals per population, while short-lived perennial species would be viable at population levels of 1,500 to 2,500 individuals or more per population. These population numbers were refined for Hawaiian plant species by the HPPRCC (1994) due to the restricted distribution of suitable habitat typical of Hawaiian plants and the likelihood of smaller genetic diversity of several species that evolved from one single introduction. For recovery of Hawaiian plants, the HPPRCC recommended a general recovery guideline of 100 mature individuals per population for long-lived perennial species, 300 mature individuals per population for short-lived perennial species, and 500 mature individuals per population for annual species.

The HPPRCC also recommended the conservation and establishment of 8 to 10 populations to address the numerous risks to the long-term survival and conservation of Hawaiian plant species. Although absent the detailed information inherent to the types of PVA models described above (Burgman *et al.* 2001), this approach nevertheless employs two widely recognized and scientifically accepted goals for promoting viable populations of listed species: (1) Creation or maintenance of multiple populations so that a single or series of catastrophic events cannot destroy the whole listed species (Luijten *et al.* 2000; Menges 1990; Quintana-Ascencio and Menges 1996); and (2) increasing the size of each population in the respective critical habitat units to a level where the threats of genetic, demographic, and normal environmental uncertainties are diminished (Hendrix and Kyhl 2000; Luijten *et al.* 2000; Meffe and Carroll 1997; Podolsky 2000; Service 1997; Tear *et al.* 1995; Wolf and Harrison 2001). In general, the larger the number of populations and the larger the size of each population, the lower the probability of extinction (Raup 1991; Meffe and Carroll 1997). This basic conservation principle of redundancy applies to Hawaiian plants. By maintaining 8 to 10 viable populations in the several proposed critical habitat units, the threats represented by a fluctuating environment are alleviated and the species has a greater likelihood of achieving long-term survival and conservation. Conversely, loss of one or more of the plant populations within any critical habitat unit could result in an increase in the risk that the entire listed species may not survive and recover.

Due to the reduced size of suitable habitat areas for these Hawaiian plant species, they are now more susceptible to the variations and weather fluctuations affecting quality and quantity of available habitat, as well as direct pressure from hundreds of species of non-native plants and animals. Establishing and conserving 8 to 10 viable populations on one or more island(s) within the historic range of the species will provide each species with a reasonable expectation of persistence and eventual recovery, even with the high potential that one or more of these populations will be eliminated by normal or random adverse events, such as hurricanes, fires, and alien plant invasions (HPPRCC 1994; Luijten *et al.* 2000; Mangel and Tier 1994; Pimm *et al.* 1998; Stacey and Taper 1992). We conclude that designation of adequate suitable habitat for 8 to 10 populations as critical habitat will help give the species a reasonable likelihood of long-term survival and recovery, based on currently available information.

In summary, the long-term survival and recovery requires the designation of critical habitat units on one or more of the Hawaiian islands with suitable habitat for 8 to 10 populations of each plant species. For *Agyroxiphium kauense,* however, the recovery goal is more than 100,000 individuals spread over the historical range of the species. Some of the habitat is currently not known to be occupied by these 47 species. To recover the species, it will be necessary to conserve suitable habitat in these unoccupied units, which in turn will allow for the establishment of additional populations through natural recruitment or managed reintroductions. Establishment of these additional populations will increase the likelihood that the species will survive and recover in the face of normal and stochastic events (*e.g.,* hurricanes; fire; and non-native species introductions, such as the predation of *Argyroxiphium kauense* by mouflon sheep) (Pimm *et al.* 1998; Stacey and Taper 1992; Mangel and Tier 1994; Joan Canfield, pers. comm. 1992).

In this proposal, we have defined the primary constituent elements on the basis of the habitat features of the areas in which the plant species are reported from such as the type of plant community, the associated native plant species, the physical location (*e.g.,* steep rocky cliffs, talus slopes, stream banks), and elevation. The areas we are proposing to designate as critical habitat provide some or all of the habitat components essential for the conservation of the 47 plant species.

We used the following considerations in delineating proposed critical habitat units. We:

1. Focused on designating units representative of the known current and historical geographic and elevational range of each species;

2. Proposed critical habitat units would allow for expansion of existing wild populations and reestablishment of wild populations within historic range, as recommended by the recovery plans for each species; and

3. Delineated critical habitat boundaries in such a way that areas with overlapping occupied or potentially suitable unoccupied habitat

could be depicted clearly (multi-species units).

We began by creating rough units for each species by screen digitizing polygons (map units) using ArcView (ESRI), a computer GIS program. The polygons were created by overlaying current and historic plant location points onto a digital map of the island's elevation contours and vegetation types (initially described in Jacobi (1989)).

The resulting shape files (delineating historic elevational range and potential, suitable habitat) were then evaluated. Elevation ranges were further refined and land areas identified as not suitable for a particular species (*i.e.,* not containing the primary constituent elements) were avoided. The resulting shape files for each species then were considered to define all suitable habitat on the island, including occupied and unoccupied habitat.

These shape files of suitable habitat were further evaluated. Several factors were then used to delineate the proposed critical habitat units from these land areas. We reviewed the recovery objectives as described above and in recovery plans for each of the species to determine if the number of populations and population size requirements needed for conservation would be available within the critical habitat units identified as containing the appropriate primary constituent elements for each species. For multi-island species multiple populations of each taxon were identified on islands where they now occur or occurred historically. Because of the need to propose critical habitat on an island-by-island basis for multi-island species we evaluated the historical distribution of each multi-island species throughout Hawaii, based on the best available information available to us at this time. We expect to refine proposed areas for these multi-island species once all the proposed rules for the Hawaiian Islands are published. This refinement will be based on an evaluation on what is essential to the species on these islands throughout its historical distribution. Of the areas identified as potentially suitable habitat, only those areas within the least disturbed suitable habitat and that were determined as essential to the species were proposed as critical habitat.

A population for this purpose is defined as a discrete aggregation of individuals located a sufficient distance from a neighboring aggregation such that the two are not affected by the same small-scale events and are not believed to be consistently cross-pollinated. In the absence of more specific information indicating the appropriate distance to assure limited cross-pollination, we are using a distance of 1,000 m (3,281 ft) based on our review of current literature on gene flow (Barret and Kohn 1991; Fenster and Dudash 1994; Havens 1998; M.H. Schierup and F.B. Christiansen 1996).

Using the above criteria we delineated the proposed critical habitat for each species. When species units overlapped, we combined units for ease of mapping. Such critical habitat units encompass a number of plant communities. Using satellite imagery and parcel data we then eliminated areas that did not contain the appropriate vegetation, associated native plant species, or features such as cultivated agriculture fields, housing developments or other areas that are unlikely to contribute to the conservation of one or more of the 47 plant species. Geographic features (ridge lines, valleys, streams, coastlines, etc.) or man-made features (roads or obvious land use) that created an obvious boundary for a unit, were used as unit area boundaries. We also used watershed delineations to dissect very large proposed critical habitat units in order to simplify the unit mapping and their descriptions.

Section 7 consultation is necessary and adverse modification generally could occur only if the primary constituent elements are affected within the critical habitat boundaries. Therefore, not all activities within critical habitat would trigger an adverse modification conclusion. In defining critical habitat boundaries, we made an effort to avoid developed areas, such as towns and other similar lands, that are unlikely to contribute to the conservation of the 47 species. However, the minimum mapping unit that we used to approximate our delineation of critical habitat for these species did not allow us to exclude all such developed areas. In addition, existing man-made features and structures within the boundaries of the mapped unit, such as buildings, roads, aqueducts, telecommunications equipment, telemetry antennas, radars, missile launch sites, arboreta and gardens, heiau (indigenous places of worship or shrines), airports, other paved areas, and other rural residential landscaped areas do not contain one or more of the primary constituent elements and would be excluded under the terms of this proposed regulation. Federal actions limited to those areas, therefore would not trigger a section 7 consultation, unless they affect the species and/or primary constituent elements in adjacent critical habitat.

In summary, for the Hawaii Island species we utilized the approved recovery plan guidance to identify appropriately sized land units containing suitable occupied and unoccupied habitat. Based on the best available information, we believe these areas constitute the habitat necessary on the island of Hawaii to provide for the conservation of these 47 species.

E. Managed Lands

Currently occupied or historically known sites containing one or more of the primary constituent elements considered essential to the conservation of these 47 plant species were examined to determine if additional special management considerations or protection are required above those currently provided. We reviewed all available management information on these plants at these sites, including published reports and surveys; annual performance and progress reports; management plans; grants; memoranda of understanding and cooperative agreements; DOFAW planning documents; internal letters and memos; biological assessments and environmental impact statements; and section 7 consultations. Additionally, each public (*i.e.,* county, State, or Federal government holdings) and private landowner on Hawaii island with a known occurrence of one of the 47 species was contacted by mail. We reviewed all information received in response to our landowner mailing and open houses held at three locations (Captain Cook, Waimea, and Hilo) on the island of Hawaii on August 1, 2, and 3, 2000, respectively. When clarification was required on the information provided to us, we followed up with a telephone contact. Because of the large amount of land on Hawaii island under State of Hawaii jurisdiction, we met with staff from the island of Hawaii's DOFAW office to discuss their current management for the plants on their lands.

Pursuant to the definition of critical habitat in section 3 of the Act, the primary constituent elements as found in any area so designated must also require ''special management considerations or protections.'' Adequate special management or protection is provided by a legally operative plan that addresses the maintenance and improvement of the essential elements and provides for the long-term conservation of the species. We consider a plan adequate when it: (1) Provides a conservation benefit to the species (*i.e.,* the plan must maintain or provide for an increase in the species' population or the enhancement or restoration of its habitat within the area covered by the plan); (2) provides

assurances that the management plan will be implemented (*i.e.,* those responsible for implementing the plan are capable of accomplishing the objectives, have an implementation schedule and/or have adequate funding for the management plan); and (3) provides assurances the conservation plan will be effective (*i.e.,* it identifies biological goals, has provisions for reporting progress, and is of a duration sufficient to implement the plan and achieves the plan's goals and objectives). If an area is covered by a plan that meets these criteria, it does not constitute critical habitat as defined by the Act because the primary constituent elements found there are not in need of special management.

In determining and weighing the relative significance of the threats that would need to be addressed in management plans or agreements, we considered the following:

(1) The factors that led to the listing of the species, as described in the final rules for listing each of the species. Effects of clearing and burning for agricultural purposes and of invasive non-native plant and animal species have contributed to the decline of nearly all endangered and threatened plants in Hawaii (Smith 1985; Howarth 1985, Stone 1985; Wagner *et al.* 1985; Scott *et al.* 1986; Cuddihy and Stone 1999; Vitousek 1992; Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999; Loope 1998). The degradation and destruction of habitat, and consumption of listed plants by wildfire has also played a direct role in the decline of over half of these species. Logging and clearing are still threats to the habitats that support these species, but to a much lesser degree than prior to listing.

Current threats to these species include non-native grass and shrub-carried wildfire; browsing, digging, rooting, and trampling from feral ungulates (including cattle, goats, sheep, and pigs); direct and indirect effects of non-native plant invasions, including alteration of habitat structure and microclimate; and disruption of pollination and gene-flow processes by adverse effects of mosquito-borne avian disease on forest bird pollinators, direct competition between native and non-native insect pollinators for food, and predation of native insect pollinators by non-native hymenopteran insects (ants). In addition, physiological processes such as reproduction and establishment continue to be stifled by fruit and flower eating pests such as non-native arthropods, mollusks, and rats, and photosynthesis and water transport affected by non-native insects, pathogens and diseases. Many of these factors interact with one another, thereby compounding effects. Such interactions include non-native plant invasions altering wildfire regimes, feral ungulates vectoring weeds and disturbing vegetation and soils thereby facilitating dispersal and establishment of non-native plants, and numerous non-native insects feeding on native plants, thereby increasing their vulnerability and exposure to pathogens and disease (Cuddihy and Stone 1999; Mack 1992; Scott *et al.* 1986; Howarth 1985, Smith 1985; D'Antonio and Vitousek 1992, Tunison *et al.* 1992; Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999, Bruegmann *et al.* 2001).

(2) The recommendations from the HPPRCC in their 1998 report to the Service (''Habitat Essential to the Recovery of Hawaiian Plants''). As summarized in this report, recovery goals for endangered Hawaiian plant species cannot be achieved without the effective control of non-native species threats, wildfire, and land use changes.

(3) The management actions needed for assurance of survival and ultimate recovery of Hawaii's endangered plants. These actions are described in our recovery plans for these 47 species (Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999), in the 1998 HPPRCC report to us (HPPRCC 1998), and in various other documents and publications relating to plant conservation in Hawaii (Mueller-Dombois 1985; Smith 1985; Stone 1985; Cuddihy and Stone 1999; Stone *et al.* 1992). In addition to monitoring the plant populations, these actions include, but are not limited to: (1) Feral ungulate control; (2) nonnative plant control; (3) rodent control; (4) invertebrate pest control; (5) fire management; (6) maintenance of genetic material of the endangered and threatened plants species; (7) propagation, reintroduction, and/or augmentation of existing populations into areas deemed essential for the recovery of these species; (8) ongoing management of the wild, outplanted, and augmented populations; and (9) habitat management and restoration in areas deemed essential for the recovery of these species.

In general, taking all of the above recommended management actions into account, the following management actions are ranked in order of importance (Service 1994, 1995a, 1996a, 1996b, 1996c, 1997a, 1998a, 1998b, 1998c, 1999). It should be noted, however, that, on a case-by-case basis, some of these actions may rise to a higher level of importance for a particular species or area, depending on the biological and physical requirements of the species and the location(s) of the individual plants: Feral ungulate control; wildfire management; non-native plant control; rodent control; invertebrate pest control; maintenance of genetic material of the endangered and threatened plant species; propagation, reintroduction, and/or augmentation of existing populations into areas deemed essential for the recovery of the species; ongoing management of the wild, outplanted, and augmented populations; maintenance of natural pollinators and pollinating systems, when known; habitat management and restoration in areas deemed essential for the recovery of the species; monitoring of the wild, outplanted, and augmented populations; rare plant surveys; and control of human activities/access.

As shown in Table 3, the proposed critical habitat designations for 47 species of plants are found on Federal, State, and private lands on the island of Hawaii. Information received in response to our public notices, letters to landowners, open houses, and meetings, and information in our files indicated that on-going conservation management action for these plants is variable, see below. Some landowners reported that they are not conducting conservation management actions on their lands while others provided information on various activities such as fencing, weeding, ungulate control, hunting, control of human access, scientific research, fire control, and propagation and/or planting of native plants. Without management plans and assurances that the plans will be implemented, we are unable to find that the land in question does not require special management or protection.

Federal Lands

Pohakuloa Training Area

The Sikes Act Improvements Act of 1997 (Sikes Act) required each military installation that includes land and water suitable for the conservation and management of natural resources to complete, by November 17, 2001, an Integrated Natural Resources Management Plan (INRMP). An INRMP integrates implementation of the military mission of the installation with stewardship of the natural resources found there. Each INRMP includes an assessment of the ecological needs on the installation, including needs to provide for the conservation of listed species; a statement of goals and priorities; a detailed description of management actions to be implemented

to provide for these ecological needs; and a monitoring and adaptive management plan. We consult with the military on the development and implementation of INRMPs for installations with listed species. We believe that bases that have completed and approved INRMPs that address the needs of the species generally do not meet the definition of critical habitat discussed above, because they require no additional special management or protection. Therefore, we do not include these areas in critical habitat designations if they meet the following three criteria: (1) A current INRMP must be complete and provide a conservation benefit to the species; (2) the plan must provide assurances that the conservation management strategies will be implemented; and (3) the plan must provide assurances that the conservation management strategies will be effective, by providing for periodic monitoring and revisions as necessary. If all of these criteria are met, then the lands covered under the plan would not meet the definition of critical habitat.

The Pohakuloa Training Area is on State-owned land that is leased and administered by the United States Army Garrison, Hawaii (Army) for live-fire training. Ten plant species (*Asplenium fragile* var. *insulare, Hedyotis coriacea, Neraudia ovata, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense*) are reported from Pohakuloa Training Area (RCUH 1997; HINHP Database 2000). The Army has written an INRMP, an Ecosystem Management Plan, an Endangered Species Management Plan, a Fire Management Plan, and annual reports on the natural resources management projects performed under the Ecosystems Management Program at Pohakuloa Training Area (Tamimi 1998; Evans 1998; Evans 1999; Schnell 1998; Schnell 1999; Sherry 1999; RCUH 1997; RCUH 1998; USAG-HI 2000). These documents and records of telephone conversations with Pohakuloa Training Area environmental staff indicate that some of the management actions identified in these plans have been implemented and have proven beneficial to populations of some species (Lena Schnell, and Scott Henderson, Pohakuloa Training Area, pers. comms. 2001). However, current management is not sufficient to address many of the factors inhibiting the long-term conservation of any of these ten species and thus provide conservation benefits to the species. In addition, there is no guarantee of long-term funding for on-going or future management actions. The U.S. Army is currently engaged in discussions with the Service to identify training-related impacts to the ten listed species at Pohakuloa Training Area and develop measures that avoid, minimize and offset those impacts. However, a more comprehensive management document has not been completed at this time. Therefore, we can not at this time find that management on this land under Federal jurisdiction is adequate to preclude a proposed designation of critical habitat.

Hawaii Volcanoes National Park

Nineteen species (*Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Clermontia pyrularia, Cyrtandra giffardii, Hibiscadelphus giffardianus, Ischaemum byrone, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Spermolepis hawaiiensis, and Zanthoxylum hawaiiense*) are reported from Hawaii Volcanoes National Park (GDSI 2000; HINHP Database 2000).

Hawaii Volcanoes National Park (HVNP) was established by Congress in 1916 as the Hawaii Volcanoes Section of Hawaii National Park. In 1961, an Act of Congress established Hawaii Volcanoes as an independent unit of the National Park System to preserve for visitor enjoyment and scientific study the HVNP's outstanding scenic, geological, and biological resources. Hawaii Volcanoes National Park encompasses diverse environments that range from sea level to the summit of Mauna Loa at 4,169 m (13,677 ft) and includes the active Kilauea volcano (National Park Service 2001).

Management programs, objectives, and their progress are documented in the 1974 Natural Resources Management Plan final environmental statement (National Park Service 1974) and Draft 2000 Resource Management Plan (National Park Service 2000) for HVNP. Although HVNP's 1974 plan outlines the management issues and strategies used to protect, restore, and enhance the rare and native plants and their habitats within the park, it does not adequately address the conservation needs of the 19 plant species reported from the Park. We are aware that specific units within the HVNP are managed for feral ungulate control. Some units are currently free of, or at sufficiently low numbers of, feral ungulates that no additional special management of these units is necessary for several of the 19 plant species for which browsing, rooting and digging by feral ungulates have been identified as the primary threats. However, sufficient information regarding species status is not available. Therefore, we have retained this area within the critical habitat proposal.

Hakalau Forest National Wildlife Refuge, Hakalau Unit

Five species (*Clermontia lindseyana, Clermontia peleana, Cyanea shipmanii, Phyllostegia racemosa,* and *Phyllostegia velutina*) are reported from the U.S. Fish and Wildlife Service's Hakalau Unit of Hakalau Forest National Wildlife Refuge (GDSI 2000; HINHP Database 2000; Service 2000b).

Hakalau Forest National Wildlife Refuge was established in 1985 for the conservation of endangered forest birds and their rainforest habitat. Refuge management efforts are focused on fencing out and removing feral cattle and pigs, controlling weeds such as *Passiflora mollissima, Rubus argutus* (prickly Florida blackberry), and *Ulex europaeus* (gorse), and planting native plant species to restore native habitat. Endangered and common Hawaiian native plants are propagated and outplanted within fenced areas. Plant and animal populations are monitored and non-native plants controlled. Volunteers play an important role by planting trees and removing weeds. Management programs, objectives, and progress are documented in the Refuge's Management Plan (Service 1989). This plan details the management issues and strategies used to protect, restore, and enhance the rare and native plants and their habitats within Refuge boundaries (Service 1989). Specific proposed actions to control feral cattle and pigs include: Fencing, one-way gates, cattle driving, public hunting, staff hunting with dogs, aerial hunting, contract hunting with dogs, and trapping. Some monitoring actions to determine the status and distribution of ungulates, measure the effectiveness of management and control techniques, and evaluate recovery of the native biota have been implemented (Service 1996d).

Specific actions for control of non-native plants are outlined in the Draft Hakalau Forest National Wildlife Refuge Alien Species Management Plan (Service 2000a). Objectives include: Fencing and removal of ungulates from Hakalau Forest National Wildlife Refuge to stimulate recovery of native vegetation and slow or prevent the establishment of non-native plants; preventing or reducing the introduction and spread of non-native plants by staff,

visitors, or other persons working or visiting Hakalau Forest National Wildlife Refuge; developing a monitoring program to identify new introductions of non-native plant species; mapping distributions of established invasive non-native plant species and developing a prioritized list of species for control; controlling targeted species of non-native plants using herbicide or manual methods; monitoring non-native plant control efforts to determine their effectiveness and monitoring response of vegetation to non-native plant control efforts; and controlling non-native birds that disperse invasive plants (Service 2000a).

Specific actions for threatened and endangered plant recovery include: Collecting seed and tissue material for propagation, reforestation, and outplanting. The number and location of outplanted common, threatened and endangered plant species is detailed in the Hakalau Forest National Wildlife Refuge Greenhouse FY 2000 annual report (Service 2000b). Actions outlined in the 1995 reforestation management plan include: Reforesting heavily grazed areas by planting seedlings of canopy tree species such as *Acacia koa, Metrosideros polymorpha,* and *Sophora chrysophylla;* reforesting heavily grazed areas and more lightly impacted areas with native understory plant species including rare and endangered species; and facilitating natural regeneration within areas less impacted by grazing using techniques such as soil scarification and herbicide treatments (Service 1995b).

Specific actions for wildland fire management are outlined in the 1997 Wildland Fire Management Strategy. These actions include: Providing an initial attack fire suppression capability; conducting prescribed fire activities in support of refuge habitat management programs; establishing appropriate fire related agreements/contracts; monitoring results of wild land and prescribed fires; updating fire management and associated plans, call-out lists, and mobilization guidelines; continuing to develop a cadre of ''red-carded'' firefighters for wild land fire, trained and equipped to accomplish the fire management program; and maintaining the refuge fire cache and fire equipment in a ready state (Service 1997b).

The plans listed above and the actions that have been implemented to manage endangered species habitats demonstrate the long-term commitment of the Refuge to ecosystem management within designated management units. Specifically, some factors causing the decline of *Clermontia lindseyana, Cyanea shipmanii, Phyllostegia racemosa,* and *Phyllostegia velutina* have been controlled within the following feral ungulate management units: Middle Honohina unit, Shipman unit, Upper Malua Unit, Upper Honohina unit, Middle Papaikou unit, and Pua Akala unit. However, we have not excluded the Refuge lands from this proposed designation.

Hakalau Forest National Wildlife Refuge, Kona Forest Unit

Two species (*Clermontia lindseyana* and *Nothocestrum breviflorum*) are reported from the U.S. Fish and Wildlife Service's Kona Forest Unit of Hakalau Forest National Wildlife Refuge (GDSI 2000; HINHP Database 2000).

The Kona Forest Unit of Hakalau Forest National Wildlife Refuge was established in 1997 to protect endangered forest birds and their habitat. Although the Service conducts some conservation management actions on this land, we have not yet begun implementing many of the actions outlined in our Conceptual Management Plan (Service 1997c) or in our Wildland Fire Management Plan (Service 2000c). Therefore, we have not proposed to exclude the Refuge from the designation.

State of Hawaii Lands

The State lands on the island of Hawaii include ceded and leased lands, and those that are administered by the Department of Hawaiian Home Lands (DHHL), the Department of Public Safety (DPS), and the Department of Land and Natural Resources (DLNR). Forty-two plants are reported from State lands (*Adenophorus periens, Achyranthes mutica, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Spermolepis hawaiiensis, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense*). DLNR lands are made up of Forest Reserves, Wildlife Sanctuaries, Natural Area Reserves, State Recreation Areas, and a Research Reserve. Within DLNR the Division of Forestry and Wildlife administers all of these lands. State Recreation Areas are administered by the Division of State Parks. DLNR also manages the DHHL lands on the island of Hawaii. The Department of Public Safety lands are at Kulani Correctional Facility and are managed by that facility in cooperation with the Olaa-Kilauea Management Partnership. The State conducts some conservation management actions on these lands and provides access to others who are conducting such activities.

Many of DLNR's programs provide beneficial effects to endangered species and their habitat. Hawaii DOFAW management actions include fences that have been built to exclude feral ungulates from several one-acre rare plant sites, propagation and dissemination of native tree species that help restore native plant assemblages around the island, participation in a cooperative ecosystem management partnership with other Federal and State agencies and a private landowner, and administration of programs that either directly or indirectly benefit endangered species and their habitats. Twelve one-acre rare dry forest plant management units were established during the 1980s to protect dry forest plants from browsing and wildfire. These units were fenced to exclude feral ungulates and maintained in a fuel-free condition that has kept frequent wildfires from consuming the enclosed rare plants. These sites have provided a seed source for endangered species restoration efforts elsewhere on the island (Vickie Caraway, DOFAW, pers. comm. 2001).

The Division of Forestry and Wildlife's Natural Area Reserves System (NARS) was established in 1970 with the intent to preserve and maintain unique Hawaiian ecosystems and geological features. The island of Hawaii has eight NARS that encompass a total of 33,407 ha (82,550 ac). Six of these NARS harbor endangered species and are managed primarily to maintain the native ecosystems that support these species. Some management actions that have occurred in many of the NARS include construction of feral ungulate exclosure fences around particularly unique plant communities, such as within older kipuka (vegetated area surrounded by bare lava flows), and other habitats that support populations of endangered species; treatment of endangered tree species for invasive

non-native insects; physical and chemical control of non-native plant populations; rat baiting; and, feral cat trapping. Such sites include the Lama and Olopua units in Manuka NAR which support *Pleomele hawaiiensis* and *Colubrina oppositifolia,* and *Flueggea neowawaraea* and *Gouania vitifolia,* respectively; the Aku unit in the Puu Makaala NAR that supports *Sicyos alba*; Laupahoehoe NAR that supports *Cyrtandra tintinnabula,* and the Puu o Umi NAR that supports a habitat ranked by the Hawaii Natural Heritage Program as a globally imperiled ecosystem, and other rare species (HINHP Database 2000; Hawaii DLNR 1982; Hawaii DLNR 1989a; Hawaii DLNR 1989b; Hawaii Heritage Program 1989).

Numerous efforts by the State of Hawaii on the island of Hawaii contribute to the conservation of listed plant species, including their rare plant management activities, administration of the NARS and Hawaii Forest Stewardship Program (FSP) programs. However these programs do not adequately address the ongoing threats to these listed plant species on their lands. In addition, there are no comprehensive management plans for the long-term conservation of endangered and threatened plants on these lands; no updated detailed reports on management actions conducted, and no assurances that management actions will be implemented in the long term or that long term funding is secure. Therefore, we cannot, at this time, find that management on these State lands is adequate to preclude a proposed designation of critical habitat.

Partnership (Federal-State-Private) Lands

Olaa Kilauea Management Area

Nine species (*Asplenium fragile* var. *insulare, Clermontia lindseyana, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Phyllostegia racemosa, Phyllostegia velutina, Plantago hawaiensis,* and *Sicyos alba*) are reported from the Olaa Kilauea Partnership lands owned by State, private and Federal entities on Hawaii island (GDSI 2000; HINHP Database 2000; Hawaii DLNR *et al.* 1999).

In an effort to protect native biological resources, landowners and other interested parties established a partnership to cooperatively manage the Olaa-Kilauea Management Area. This 12,950 ha (32,000 ac) management area includes lands owned or controlled by the Hawaii Department of Public Safety (Kulani Correctional Facility), the Hawaii Department of Land and Natural Resource (Puu Makaala Natural Area Reserve), the National Park Service (Olaa tract of Hawaii Volcanoes National Park), and privately owned lands in Kilauea Forest. The partnership cooperative agreement signed in 1994 includes the commitment to jointly develop a natural resources management plan that includes, but is not limited to, feral animal and non-native plant control measures, collaborative research projects, and habitat protection and restoration. A group of landowners and managers of these project lands as well as representatives from the Service, USGS–BRD and the U.S. Forest Service (USFS) developed a five year management plan (Hawaii DLNR *et al.* 1999).

The overall objective of management in the project area is the protection and recovery of native ecosystems to the point that they are self-sustaining, native-dominated communities with secure populations of native plant, invertebrate, and forest bird species. Management efforts are aimed at controlling feral pigs and non-native plants. As objectives for feral pig and non-native plant control are achieved and large, pig-free areas become available for more intensive management control for other predators, (*i.e.* black rats (which eat the fruit and/or seeds of some plants species)) restoration of rare plant species will be implemented (Hawaii DLNR *et al.* 1999).

Specific management actions to address feral ungulates include the construction of fences surrounding management units; staff hunting, trapping and snaring; and monitoring transects to detect ingress and determine efficiency of the feral animal control program within the management areas (Hawaii DLNR *et al.* 1999).

Specific management actions to address non-native plants include mapping the distribution of priority non-native plants; development of a control strategy; herbicide or manual control; follow-up monitoring to determine the effectiveness of control efforts; and, long-term monitoring of non-native plants within and outside fenced areas (Hawaii DLNR *et al.* 1999).

Specific management for rare plant inventory, monitoring and recovery actions include additional surveys and mapping the distribution of individual plants and populations; intensive monitoring to assess potential threats; evaluation of forest stand structure and reproduction; and, monitoring following management actions such as fencing and pig control. Propagation and outplanting programs are being considered for some rare plant species that appear to be inadequately reproducing in the wild or for those with inadequate genetic representation in the wild (*i.e.,* few individuals). As rare plants are located, representative genetic material is collected and maintained at the Volcano Mid-Elevation Rare Plant Facility. In some instances spot fencing is erected for interim protection from ungulates (Hawaii DLNR *et al.* 1999).

However these actions do not adequately address the ongoing threats to the listed plant species on this land. In addition, there is no legally operative plan that addresses the maintenance and improvement of the essential elements and provides for the long term maintenance of the species. Therefore, we cannot, at this time, find that management on these lands is adequate to preclude a proposed designation of critical habitat.

Private Lands

Kaupulehu mauka (toward the mountain, inland)

This 2 ha (5 ac) parcel in the District of North Kona is owned by the National Tropical Botanical Garden and is managed expressly for the benefit of endangered plants and their habitat. Currently, there are three endangered plant species that naturally occur within this parcel, *Colubrina oppositifolia, Nothocestrum breviflorum,* and *Pleomele hawaiiensis.* The primary factors inhibiting the recovery of these species in this area was limited seedling growth of these dry forest trees due to altered microclimate conditions by the non-native plant *Pennisetum setaceum* (fountain grass), wildfire, seed predation by rats and mice, and occasional browsing of seedlings and saplings by feral sheep and goats. A cattle fence was erected in 1950 and the cattle removed, however there are local accounts of feral sheep and goats using this area off-and-on until the fence was improved with hogwire and barbed wire in 1996. In 1996 the North Kona Dry Forest Working Group was organized to address recovery of dry forest ecosystems in the region and the group focused on this 2 ha (5 ac) parcel as its pilot project. The group has since removed all of the *Pennisetum setaceum* and thus reduced the wildfire hazard to this area. Rodent populations have also been controlled within this unit and numerous native understory species have been planted. The North Kona Dry Forest Working Group is committed to long-term management of this parcel for the benefit of Hawaiian dry forest ecosystems. However, no legally operative plan has been prepared for the

site. In addition, this group operates with year-to-year funding and there is no assurance that funding will be available for long-term maintenance of the on-going management activities. Therefore, we cannot at this time, find that management on this land is adequate to preclude a proposed designation of critical habitat (Hawaii Forest Association, *in litt.* 1998; M. Bruegmann, pers. comm. 1999).

Kaupulehu makai (toward the ocean)

This 28 ha (70 ac) management unit in the District of North Kona is part of a larger parcel owned by the Kamehameha Schools Bishop Estate. Four endangered plant species naturally occur within this dry forest management unit, *Bonamia menziesii, Colubrina oppositifolia, Nothocestrum breviflorum,* and *Pleomele hawaiiensis.* The primary factors inhibiting the recovery of these species in this area was the limited seedling growth of these dry forest trees due to altered microclimate conditions by non-native *Pennisetum setaceum,* wildfire, seed predation by rats and mice, and occasional browsing of seedlings and saplings by feral sheep and goats. A sheep and goat fence was erected in 1999 by the North Kona Dry Forest Working as part of an effort to expand dry forest restoration efforts to larger areas within the region. The group is in the process of removing *Pennisetum setaceum* from this site to eliminate the wildfire hazard to this area and enhance forest restoration efforts. Rodent populations are also being controlled within this unit and numerous native understory species have been planted. The North Kona Dry Forest Working Group is committed to long-term management of this parcel for the benefit of Hawaiian dry forest ecosystems and no management activities beyond those planned and currently occurring at the site appear to be needed to provide for the conservation of the four listed plant species. However, no legally operative plan has been prepared for the site. In addition, this group operates with year-to-year funding and there is no assurance that funding will be available for long-term maintenance of the on-going management activities. Therefore, we cannot at this time, find that management of this land is adequate to preclude a proposed designation of critical habitat (Hawaii Forest Industry Association *in litt.* 1998).

If we receive information during the public comment period that any of the lands within the proposed designations are actively managed to promote the conservation and recovery of the 47 listed species at issue in this proposed designation, in accordance with long term conservation management plans or agreements, and there are assurances that the proposed management actions will be implemented and effective, the Service can consider this information when making a final determination of critical habitat.

In addition, we are aware that other private landowners and the State of Hawaii are considering the development of land management plans or agreements that may promote the conservation and recovery of endangered and threatened plant species on the island of Hawaii. We support these efforts and provide technical assistance whenever possible. We are soliciting comments on whether future development and approval of conservation measures (*e.g.,* Habitat Conservation Plans, Conservation Agreements, Safe Harbor Agreements) should trigger revision of designated critical habitat to exclude such lands and, if so, by what mechanism.

The proposed critical habitat units described below constitute our best assessment of the physical and biological features needed for the conservation of the 47 plant species (*Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum* var. *tomentosum,* and *Zanthoxylum hawaiiense*) and the special management needs of these species, and are based on the best scientific and commercial information available and described above. We put forward this proposal acknowledging that we have incomplete information regarding many of the primary biological and physical requirements for these species. However, both the Act and the relevant court order requires us to proceed with designation at this time based on the best information available. As new information accrues, we may reevaluate which areas warrant critical habitat designation. We anticipate that comments received through the public review process and from any public hearings, if requested, will provide us with additional information to use in our decision making process and in assessing the potential impacts of designating critical habitat for one or more of these species.

The approximate areas of proposed critical habitat by landownership or jurisdiction are shown in Table 5.

TABLE 5.—APPROXIMATE PROPOSED CRITICAL HABITAT AREA BY UNIT AND LAND OWNERSHIP OR JURISDICTION, HAWAII COUNTY, HAWAII.[1]

Unit name	State/Local	Private	Federal	Total
Hawaii A1	518 ha (1,280 ac)	202 ha (498 ac)		719 ha[1] (1,777 ac)
Hawaii A2	1,779 ha (4,395 ac)	907 ha (2,240 ac)		2,685 ha[1] (6,635 ac)
Hawaii B	5,738 ha (14,178 ac)	2,462 ha (6,084 ac)		8,200 ha (20,263 ac)[1]
Hawaii C	38 ha (94 ac)	<1 ha (<1 ac)		38 ha (94 ac)
Hawaii D1		55 ha (136 ac)		55 ha (136 ac)
Hawaii D2		43 ha (107 ac)		43 ha (107 ac)
Hawaii D3		257 ha (636 ac)		257 ha (636 ac)
Hawaii D4		14 ha (34 ac)		14 ha (34 ac)
Hawaii D5		1 ha (4ac)		1 ha (4 ac)
Hawaii D6		36 ha (89 ac)		36 ha (89 ac)

TABLE 5.—APPROXIMATE PROPOSED CRITICAL HABITAT AREA BY UNIT AND LAND OWNERSHIP OR JURISDICTION, HAWAII COUNTY, HAWAII.[1]—Continued

Unit name	State/Local	Private	Federal	Total
Hawaii D7	.....	112 ha (278 ac)	.....	112 ha (278 ac)
Hawaii D8	.....	8 ha (21 ac)	.....	8 ha (21 ac)
Hawaii E	1,565 ha (3,866 ac)	52 ha (128 ac)	1,375 ha (3,399 ac)	2,992 ha (7,393 ac)
Hawaii F	4,639 ha (11,464 ac)	946 ha (2,338 ac)	8,321 ha (20,561 ac)	13,906 ha (34,363 ac)
Hawaii G	22,274 ha (55,040 ac)	6,378 ha (15,760 ac)	3,634 ha (8,980 ac)	32,286 ha (79,781 ac)[1]
Hawaii H	46 ha (113 ac)	1,406 ha (3,476 ac)	3,870 ha (9,563 ac)	5,322 ha (13,151 ac)[1]
Hawaii I	.....	8 ha (20 ac)	514 ha (1,269 ac)	522 ha (1,290 ac)[1]
Hawaii J	4,304 ha (10,636 ac)	499 ha (1,233 ac)	262 ha (647 ac)	5,065 ha (12,516 ac)
Hawaii K	8,742 ha (21,601 ac)	6,552 ha (16,191 ac)	.....	15,294 ha (37,792 ac)
Hawaii L	<1 ha (<1 ac)	.....	38,504 ha (95,145 ac)	38,505 ha (95,148 ac)[1]
Hawaii M1	19 ha (46 ac)	.....	.....	19 ha (46 ac)
Hawaii M2	133 ha (328 ac)	.....	.....	133 ha (328 ac)
Hawaii M3	112 ha (277 ac)	29 ha (72 ac)	.....	141 ha (349 ac)
Hawaii M4	141 ha (347 ac)	.....	.....	141 ha (347 ac)
Hawaii M5	.....	.....	533 ha (1,316 ac)	533 ha (1,316 ac)
Hawaii N1	35 ha (87 ac)	.....	.....	35 ha (87 ac)
Hawaii N2	439 ha (1,084 ac)	.....	2 ha (6 ac)	441 ha (1,091 ac)[1]
Hawaii O	179 ha (441 ac)	36 ha (90 ac)	.....	215 ha (531 ac)
Hawaii P	12 ha (31 ac)	534 ha (1,320 ac)	.....	547 ha[1] (1,351 ac)
Hawaii Q	3,148 ha (7,778 ac)	401 ha (992 ac)	.....	3,549 ha (8,770 ac)
Hawaii R	336 ha (830 ac)	51 ha (126 ac)	.....	387 ha (955 ac)[1]
Hawaii S	351 ha (868 ac)	32 ha (79 ac)	.....	383 ha (947 ac)
Hawaii T	1,094 ha (2,704 ac)	395 ha (977 ac)	.....	1,489 ha (3,681 ac)
Hawaii U	.....	.....	615 ha (1,520 ac)	615 ha (1,520 ac)
Hawaii V	.....	951 ha (2,351 ac)	.....	951 ha (2,351 ac)
Hawaii W	.....	1,479 ha (3,654 ac)	.....	1,479 ha (3,654 ac)
Hawaii X	138 ha (340 ac)	.....	.....	138 ha (340 ac)
Hawaii Y1	4 ha (11 ac)	208 ha (513 ac)	.....	212 ha (524 ac)
Hawaii Y2	195 ha (482 ac)	139 ha (344 ac)	.....	334 ha (826 ac)
Hawaii Z	8,317 ha (20,552 ac)	2,421 ha (5,983 ac)	.....	10,738 ha (26,535 ac)
Hawaii AA	26,198 ha (64,736 ac)	2,107 ha (5,206 ac)	79 ha (196 ac)	28,384 ha (70,138 ac)
Hawaii BB	43 ha (106 ac)	.....	.....	43 ha (106 ac)
Total	90,534 ha (223,715 ac).	28,725 ha (70,980 ac)	57,709 ha (142,601 ac).	176,968 ha (437,285 ac)

[1] Area differences due to digital mapping discrepancies between TMK data (GDSI 2000) and USGS coastline, or differences due to rounding.

Proposed critical habitat for 47 species includes lands under private, State, and Federal jurisdiction (owned and leased lands), with Federal lands including lands managed by the Department of Defense, U.S. Fish and Wildlife Service, Government Services Administration, and the National Park Service. Lands proposed as critical habitat have been divided into 28 units (Hawaii A1 through Hawaii BB) on the island of Hawaii. A brief description of each unit is presented below.

Descriptions of Critical Habitat Units

Hawaii A

The proposed unit Hawaii A (subunits A1 and A2) provides occupied habitat for two species: *Nothocestrum breviflorum* and *Pleomele hawaiiensis.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Nothocestrum breviflorum* and *Pleomele hawaiiensis,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii A).

This unit cluster contains a total of 3,404 ha (8,412 ac) on State and private lands. Unit A1 is in the Pololu and Honokane Nui watersheds and unit A2 is bordered on the west by the Honokane Iki watershed and on the east by the Waimanu watershed and contains portions of the Honokea, Honopue, Kailikaula, Kaimu, Kalele, Kolealiilii, Kukui, Nakooko, Ohiahuea, Pae, Paopao South, Punalulu, Waiaalala, Waiapuka, Waikaloa, Waimaile, and Waipahi watersheds. It contains a portion of the Kohala forest Reserve. The natural features found in this unit are: Unit A1, Kupenau summit and Pololu Stream; unit A2, Kamoloumi Stream, Kolealiilii Stream, Ohiahuea Stream, Oniu Stream, Paohia Gulch, Waipani Stream, and Waiapuka Stream.

Key to Table for Hawaii A–BB

1. This unit is needed to meet the recovery plan objectives of 8 to 10 viable populations (self perpetuating and sustaining for at least 5 years) with 100 to 500 mature, reproducing individuals per species throughout its historical range as specified in the recovery plans.
2. Island endemic.
3. Multi-island species with current locations on other islands.
4. Multi-island species with no current locations on other islands.
5. Current locations do not necessarily represent viable populations with the required number of mature individuals.
6. Several current locations may be affected by one naturally occurring, catastrophic event.
7. Species with variable habitat requirements, usually over wide areas. Wide ranging species require more space per individual over more land area to provide needed primary constituent elements to maintain healthy population size.

8. Not all currently occupied habitat was determined to be essential to the recovery of the species.

9. Life history, long-lived perennial—100 mature, reproducing individuals needed per population.

10. Life history, short-lived perennial—300 mature, reproducing individuals needed per population.

11. Life history, annual—500 mature, reproducing individuals needed per population.

12. Narrow endemic, the species probably never naturally occurred in more than a single or a few populations.

13. Species has extremely restricted, specific habitat requirements.

14. Hybridization is possible so distinct populations of related species should not overlap, requiring more land area.

‡ Not all suitable habitat is designated, only those areas essential for the conservation of the species.

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Table for Hawaii A

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Nothocestrum breviflorum	X*	X			X	X	X	X	X						*Species is wide ranging.‡
Pleomele hawaiiensis	X*	X			X	X	X		X						*Species is wide ranging.‡

Hawaii B

The proposed unit Hawaii B provides occupied habitat for three species: *Achyranthes mutica, Clermontia drepanomorpha,* and *Phyllostegia warshaueri.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or

more of the 8 to 10 populations for each species and 300 mature individuals per population for *Achyranthes mutica, Clermontia drepanomorpha,* and *Phyllostegia warshaueri,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii B).

This unit contains a total of 8,200 ha (20,263 ac) on State and privately owned lands. It is in portions of the Haloa, Honokane Nui, Honopue, Kaimu, Kawaihae, Lamimaumau, Nakooko, Ohiahuea, Waikaloa, Waikoloa/Waiulaula, Wailoa/Waipio, and Waimanu watersheds. It contains a portion of the Kohala Forest Reserve. Natural features found in this unit are Eke (summit), Kaholopoohina (summit), Kaiholena (summit), Kaunu o Kaleioohie (summit), Kilohana Gulch, Kohala Mountains (summit), Makalii (summit), Momoualoa Gulch, Opaeloa (summit), Puu Ahia, Puu Iki, Puu Kamoa, Puu Kawaiwai, Puu Laelae, Puu Lanikepu, Puu Loa (summit), Puu Makela, Puu Mala, Puu Ohu, Puu Palailai, Puu Pohoulaula, Puu o Umi, and Waiaka Gulch.

Table for Hawaii B

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Achyranthes mutica	X*			X	X	X	X			X					*Not enough suitable habitat for 8 to 10 pops
Clermontia drepanomorpha	X	X			X	X	X			X					
Phyllostegia warshaueri	X	X			X	X	X			X					

Hawaii C

The proposed unit Hawaii C provides occupied habitat for one species: *Sesbania tomentosa.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population throughout its known historical range considered by the recovery plans to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii C).

This unit contains a total of 38 ha (94 ac) on State and privately owned lands. The unit is in the Pohakuloa watershed and contains a portion of the Hapuna Beach State Recreation Area. This unit is north of Wailaea Bay and south of Hapuna Bay and adjacent to Kanekanaka Point.

Table for Hawaii C

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Sesbania tomentosa	X*		X		X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.

Hawaii D

The proposed unit Hawaii D (subunits D1 through D8) provides occupied habitat for three species: *Isodendrion hosakae, Portulaca sclerocarpa,* and *Vigna o-wahuensis.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population for all three species, throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species.

This unit also provides unoccupied habitat for the above three species: *Isodendrion hosakae, Portulaca sclerocarpa,* and *Vigna o-wahuensis.* Designation of this unit is essential to the conservation of these species because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more additional populations necessary to meet the recovery objectives of 8 to 10 populations for each species and 300 mature individuals per population for *Isodendrion hosakae, Portulaca sclerocarpa,* and *Vigna o-wahuensis,* throughout their known historical range (see the discussion of conservation requirements in Section D, and in the table for Hawaii D).

This unit cluster contains a total of 526 ha (1,305 ac) on privately owned land. The units consist of puu (hills, summits, cinder cones) in the areas between the Kamakahala watershed in the west and Waipunahoe watershed in the east (with portions of Waikoloa/Waiulaula and Waiulili). Natural features for this unit are: Unit D1 contains Puu Pa; unit D2 contains Holoholoku summit; unit D3 contains Puu Io, Puu Kaliali, Puu Kekuakahea, and Puu Makahalau; unit D4 contains Heihei summit; unit D5 contains Nohona o Haeiki summit; unit D6 contains Nohona o Hae summit; unit D7 contains two unnamed puu; and unit D8 contains Puu Papapa.

Table for Hawaii D

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Isodendrion hosakae	X	X			X					X		X	X*		*Cinder cones.
Portulaca sclerocarpa	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Vigna o-wahuensis	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.

Hawaii E

The proposed unit Hawaii E provides occupied habitat for three species: *Clermontia lindseyana, Clermontia pyrularia,* and *Phyllostegia racemosa.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population for *Clermontia lindseyana, Clermontia pyrularia,* and *Phyllostegia racemosa,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii E).

This unit contains a total of 2,992 ha (7,393 ac) on State, Federal, and private lands. It is bounded on the north by Kaawali watershed and on the south by Umauma watershed and contains portions of the Haakoa, Kaiwilahilahi, and Waikaumalu watersheds. This unit contains portions of the Hakalau Forest NWR and the Hilo Forest Reserve. Natural features found in this unit are Nauhi Gulch and Puu Lahohinu.

Table for Hawaii E

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Clermontia lindseyana	X		X		X	X	X	X		X					
Clermontia pyrularia	X	X			X	X	X			X					
Phyllostegia racemosa	X	X			X	X				X			X*		*Epiphytic.

Hawaii F

The proposed unit Hawaii F provides occupied habitat for six species: *Cyanea platyphylla, Cyanea shipmanii, Cyrtandra giffardii, Cyrtandra tintinnabula, Phyllostegia racemosa, Phyllostegia warshaueri.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for this species and 300 mature individuals per population of *Cyanea platyphylla, Cyanea shipmanii, Cyrtandra giffardii, Cyrtandra tintinnabula, Phyllostegia racemosa, Phyllostegia warshaueri,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of these species.

This unit also provides unoccupied habitat for one species: *Clermontia peleana.* Designation of this unit is essential to the conservation of this species because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more additional populations necessary to meet the recovery objectives of 8 to 10 populations and 100 mature individuals per population, throughout its known historical range (see the discussion of conservation requirements in Section D, and in the table for Hawaii F).

This unit contains a total of 13,906 ha (34,363 ac) on State, Federal, and private lands. This unit contains portions of the Haakoa, Hakalau, Honolii, Kaawalii, Kaiwiki, Kaiwilahilahi, Kapue, Kaula, Kawainui, Kilau, Kolekole, Laupahoehoe, Manoloa, Manowaiopae, Maulua, Nanue, Ninole, Pahale, Pahoehoe, Pohakupuka, Umauma, Waiaama, Waikaumalo, Wailuku, and Waipunalei watersheds. Unit F contains portions of the Hakalau Forest National Wildlife Refuge, Hilo Forest Reserve, Laupahoehoe Natural Area Reserve and Manowaialee Forest Reserve. The natural features include Haakoa Stream, Kaawalii Stream, Kaiwilahilahi Stream, Kaloaloa (summit), Kaula Stream, Magnetic Hill, Pahale Stream, Painiu Stream, and Waikaumalo Stream.

Table for Hawaii F

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Clermontia peleana	X			X*			X			X					*Historical on Hawaii
Cyanea platyphylla	X	X			X	X	X	X		X					
Cyanea shipmanii	X	X			X	X	X			X					
Cyrtandra giffardii	X				X	X	X	X		X					
Cyrtandra tintinnabula	X	X			X	X	X	X		X					
Phyllostegia racemosa	X	X			X	X				X			X *		*Epiphytically.
Phyllostegia warshaueri	X	X			X	X	X			X					

Hawaii G

The proposed unit Hawaii F provides occupied habitat for 11 species: *Argyroxiphium kauense, Asplenium fragile* var. *insulare, Clermontia lindseyana, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Phyllostegia racemosa, Phyllostegia velutina, Plantago hawaiense,* and *Sicyos alba.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population for *Asplenium fragile* var. *insulare, Clermontia lindseyana, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Phyllostegia racemosa, Phyllostegia velutina, Plantago hawaiense,* and *Sicyos alba,* or greater than 100,000 total individuals for *Argyroxiphium kauense,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of these species.

This unit also provides unoccupied habitat for one species: *Clermontia peleana.* Designation of this unit is essential to the conservation of this species because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more additional populations necessary to meet the recovery objectives of 8 to 10 populations and 300 mature individuals per population, throughout its known historical range (see the discussion of conservation requirements in Section D, and in the table for Hawaii G).

This unit contains a total of 32,286 ha (79,781 ac) on State, Federal, and privately owned lands. It is in portions of Kaahakini, Wailoa, and Wailuku watersheds. It contains portions of the Hawaii Volcanoes National Park, Mauna Loa Forest Reserve, Hilo Forest Reserve, Olaa Forest Reserve, Puu Makaala Natural Area Reserve, Upper Waiakea Forest Reserve, and Waiakea 1942 Lava Flow Natural Area Reserve. The natural features of this unit include Kulani (summit), Lava Flow Of 1852, Lava Flow Of 1855, Lava Flow Of 1881, Puu Kipu, Puu Lalaau, Puu Lau, Puu Makaala, Solomons Waterhole, Waipahoehoe Gulch, and Waterhole Spring.

Table for Hawaii G

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Argyroxiphium kauense		X			X	X	X	X	X						100,000 individuals needed for recovery according to recovery plan.
Asplenium fragile var. insulare	X*		X		X	X		X		X			X**		*Species is wide ranging, each island was probably one large, population. ** Big, moist lava tubes (from 3.05 m to 4.57 m (10 to 15 ft) in diameter), pits, deep cracks, and lava tree molds, with at least a moderate soil or ash accumulation
Clermontia lindseyana	X		X		X	X	X	X		X					

Clermontia peleana	X			X*			X			X					*Historical on Hawaii
Cyanea platyphylla	X	X			X	X	X	X		X					
Cyanea shipmanii	X	X			X	X	X			X					
Cyanea stictophylla	X	X			X		X			X					
Cyrtandra giffardii	X				X	X	X	X		X					
Phyllostegia racemosa	X	X			X	X				X			X*		*Epiphytic.
Phyllostegia velutina	X	X			X	X	X	X		X					
Plantago hawaiensis	X*	X			X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Sicyos alba	X	X			X	X	X			X					

Hawaii H

The proposed unit Hawaii H provides occupied habitat for four species: *Argyroxiphium kauense, Phyllostegia racemosa, Plantago hawaiensis,* and *Silene hawaiiensis.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations of *Phyllostegia racemosa, Plantago hawaiensis,* and *Silene hawaiiensis* and 300 mature individuals per population for *Phyllostegia racemosa, Plantago hawaiensis, and Silene hawaiiensis,* or greater than 100,000 total individuals for *Argyroxiphium kauense,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii H).

This unit contains a total of 5,322 ha (13,151 ac) on State, Federal and privately owned lands. This unit is in the Kapapala watershed and contains a portion of Hawaii Volcanoes National Park. The natural features of this unit include the Keamoku Lava Flows, Kipuka Kulalilo, and Kipuka Maunaiu.

Table for Hawaii H

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Argyroxiphium kauense	0	X			X	X	X	X	X						*>100,000 individuals needed for recovery according to recovery plan.
Phyllostegia racemosa	X	X			X	X				X			X*		*Epiphytically.
Plantago hawaiensis	X*	X			X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Silene hawaiiensis	X*	X			X	X	X			X					*Species is wide ranging, each island was probably one large, population.

Hawaii I

The proposed unit Hawaii I provides occupied habitat for two species: *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Hibiscadelphus giffardianus* and *Melicope zahlbruckneri,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii I).

This unit contains a total of 522 ha (1,290 ac) on Federal and privately owned lands. It lies in the Kapapala watershed and in the Hawaii Volcanoes National Park. This unit contains the natural features Kipuka Ki and Kipuka Puaulu.

Table for Hawaii I

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Hibiscadelphus giffardianus	X*	X			X	X	X		X			X		X	*Not enough suitable habitat exists for 8 to 10 populations at this time.
Melicope zahlbruckneri	X*	X			X	X	X	X	X						*Species is wide ranging.

Hawaii J

The proposed unit Hawaii J provides occupied habitat for one species: *Adenophorus periens.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population for *A. periens,* throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii J).

This unit contains a total of 5,065 ha (12,516 ac) on State, Federal, and privately owned lands. This unit lies in the Kaahakini watershed in the north and the Kilauea watershed in the south. This unit contains a portion of the Hawaii Volcanoes National Park and Kahaulea Natural Area Reserve. The natural features of this unit include the Lava Flows of 1969, 1970, and 1972.

Table for Hawaii J

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Adenophorus periens	X*		X		X	X		X		X			X**		*Species is wide ranging, each island was probably one large, population. **Epiphytic.

Hawaii K

The proposed unit Hawaii J provides occupied habitat for five species: *Argyroxiphium kauense, Asplenium fragile* var. *insulare, Clermontia lindseyana, Cyanea stictophylla,* and *Phyllostegia velutina.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population for *Phyllostegia racemosa, Plantago hawaiensis,* and *Silene hawaiiensis,* or greater than 100,000 total individuals for *Argyroxiphium kauense,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species. This unit also provides unoccupied habitat for one species: *Melicope zahlbruckneri.* Designation of this unit is essential to the conservation of this species because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more additional populations necessary to meet the recovery objectives of 8 to 10 populations and 100 mature individuals per population, throughout its known historical range (see the discussion of conservation requirements in Section D, and in the table for Hawaii K).

This unit contains a total of 15,294 ha (37,792 ac) on State and privately owned lands. This unit lies mostly in the Pahala watershed but has a small portion in the Kapapala watershed in the northeast and the Hilea watershed in the southwest. It contains a portion of the Kau Forest Reserve and the Kapapala Forest Reserve. The natural features of this unit include Maunaanu Waterhole and Puu Kinikini.

Table for Hawaii K

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Argyroxiphium kauense	0	X			X	X	X	X	X						*>100,000 individuals needed for recovery according to recovery plan.
Asplenium fragile var. insulare	X*		X		X	X		X		X			X**		*Species is wide ranging, each island was probably one large, population. ** Big, moist lava tubes (from 3.05 m to 4.57 m (10 to 15 ft) in diameter), pits, deep cracks, and lava tree molds, with at least a moderate soil or ash accumulation
Clermontia lindseyana	X		X		X	X	X	X		X					
Cyanea stictophylla	X	X			X		X			X					
Melicope zahlbruckneri	X	X			X	X	X	X	X						
Phyllostegia velutina	X	X			X	X	X	X		X					

Hawaii L

The proposed unit Hawaii L provides occupied habitat for three species: *Pleomele hawaiiensis, Portulaca sclerocarpa,* and *Sesbania tomentosa.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Pleomele hawaiiensis,* or 300 mature individuals per population for *Portulaca sclerocarpa* and *Sesbania tomentosa,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii L).

This unit contains a total of 38,505 ha (95,148 ac) on Federal and State lands. This unit is mainly in the Kapapala watershed and has a portion in the Kilauea watershed in the east and the Pahala watershed in the west. This unit lies completely in the Hawaii Volcanoes National Park. Natural features of this unit include Alae Crater, Aloi Crater, Byron Ledge, Chain Of Craters, Cinder Cone (summit), Devils Throat (crater), Halape (cape), Halemaoli (summit), Halemaumau (crater), Hiiaka Crater, Hilina Pali (pali = cliff), Holei Pali, Kahue Point, Kalanaokuaiki Pali, Kamakaia Hills, Kamakaia Lava Flow, Kamakaiauka (summit), Kamakaiawaena (summit), Kamooalii Lava Flow, Kau Desert, Keana Bihopa (summit), Keanakakoi Crater, Kilauea Crater, Kilauea Iki Crater, Kipuka Keana Bihopa (lava flow), Kipuka Pepeiau, Kokoolau Crater, Kukalauula Pali, Lava Flow Of 1919, Lava Flow Of 1920, Lava Flow Of 1921, Lava Flow Of 1954, Lava Flow Of 1961, Lava Flow of 1959, Lava Flow of 1961, Lele o Kalihipaa (cliff), Lua Manu Crater, Makahanu Pali, Pauahi Crater, Poliokeawe Pali, Puhimau Crater, Puu Huluhulu, Puu Kaone, Puu Kapukapu, Puu Koae, Puu Puai, Puueo Pali, Spatter Cone, Steaming Bluff, Uwekahuna Bluff, Waiwelawela Point, and Waldron Ledge.

Table for Hawaii L

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Pleomele hawaiiensis	X*	X			X	X	X		X						*Species is wide ranging.‡
Portulaca sclerocarpa	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Sesbania tomentosa	X*		X		X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.

Hawaii M

The proposed unit Hawaii M (subunits M1 through M5) provides occupied habitat for one species: *Ischaemum byrone.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for this species and 300 mature individuals per population throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii M).

This unit cluster contains a total of 967 ha (2,386 ac) on State, Federal, and private lands. M1 and M2 lie in the Kaahakini watershed along the coast and M3, M4, and M5 lie in the Kilauea watershed along the coast. M3 contains the MacKenzie State Recreation Area and a portion of the Malama-Ki Forest Reserve and M5 lies completely in Hawaii Volcanoes National Park. The natural features of this unit cluster include: M1, no named features but the unit lies just south of Leleiwi Point; M2, no named features but the unit lies adjacent to Opihi Rock, an off-shore islet; M3, Kaakepa (summit) and Lililoa (cape); M4, Waipuku Point; and M5, Puu Manawalea.

Table for Hawaii M

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Ischaemum byrone	X*		X		X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.

Hawaii N

The proposed unit Hawaii N (N1 and N2) provides occupied habitat for one species: *Sesbania tomentosa.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population for this species, throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii N).

This unit cluster contains a total of 476 ha (1,178 ac) on State and Federal lands. This unit is in the South Point watershed along the coast. The natural features of this unit include: N1, Keoneokanuku Bay and N2, Kaalo (bay), Kahawai Kolono (stream), Kahukupoko (cape), Kaulani (cape), Kipuka Hanalua, Kipuka Kaahue, Lua (crate), Makalei, Lua o Palahemo (lake), Luakeananolo (bay), Pali Haukeuke, and Puu o Mahana.

Table for Hawaii N

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Sesbania tomentosa	X*		X		X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.

Hawaii O

The proposed unit Hawaii O provides occupied habitat for one species: *Mariscus fauriei.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population, throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii O).

This unit contains a total of 215 ha (531 ac) on State and private lands. This unit lies in the South Point Watershed. This unit has no named natural features but lies between Kipuka Puu Kou in the east and the Kamaoa Homesteads in the west.

Table for Hawaii O

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Mariscus fauriei	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.

Hawaii P

The proposed unit Hawaii P provides occupied habitat for one species: *Pleomele hawaiiensis.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 100 mature individuals per population for *Pleomele hawaiiensis* throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii P).

This unit contains a total of 547 ha (1,351 ac) on State and privately owned lands. This unit lies completely in the Kauna watershed. Natural features of this unit include Kipuka Kapulehu, Kipuka Mamane, and the Lava Flow of 1887.

Table for Hawaii P

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Pleomele hawaiiensis	X*	X			X	X	X		X						*Species is wide ranging.

Hawaii Q

The proposed unit Hawaii Q provides occupied habitat for five species: *Colubrina oppositifolia, Diellia erecta, Flueggea neowawraea, Gouania vitifolia,* and *Neraudia ovata.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Colubrina oppositifolia* and *Flueggea neowawraea,* or 300 mature individuals per population for *Diellia erecta, Gouania vitifolia,* and *Neraudia ovata,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii Q).

This unit contains a total of 3,549 ha (8,770 ac) on State and privately owned lands. This unit lies mostly in the Kauna watershed with a portion in the Kiilae in the southwest. A large portion of this unit lies in the Manuka Natural Area Reserve. The natural features in this unit include unnamed lava flows and tubes.

Table for Hawaii Q

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Colubrina oppositifolia	X*		X		X	X	X	X	X						*Species is wide ranging, each island was probably one large, population.
Diellia erecta	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Flueggea neowawraea	X*		X		X	X	X	X	X						*Species is wide ranging, each island was probably one large, population.
Gouania vitifolia	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Neraudia ovata	X	X			X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.

Hawaii R

The proposed unit Hawaii R provides occupied habitat for two species: *Diellia erecta* and *Flueggea neowawraea.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Flueggea neowawraea,* or 300 mature individuals per population for *Diellia erecta,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii R).

This unit contains a total of 387 ha (955 ac) on State and privately owned lands. This unit lies in the Kiilae watershed and lies mostly in the South Kona Forest Reserve. There are no named natural features in this unit.

Table for Hawaii R

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Diellia erecta	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population.
Flueggea neowawraea	X*		X		X	X	X	X	X						*Species is wide ranging, each island was probably one large, population.

Hawaii S

The proposed unit Hawaii S provides occupied habitat for two species: *Cyanea hamatiflora* ssp. *carlsonii* and *Cyanea stictophylla.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii S).

This unit contains a total of 383 ha (947 ac) on State and privately owned lands. This unit is in the Kiilae watershed. This unit contains a portion of the Kipahoehoe Natural Area Reserve. The natural feature of this unit includes a portion of the Lava Flow of 1919.

Table for Hawaii S

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Cyanea hamatiflora ssp. carlsonii	X	X			X	X	X			X					
Cyanea stictophylla	X	X			X		X			X					

Hawaii T

The proposed unit Hawaii T provides occupied habitat for one species: *Cyanea stictophylla.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population for this species throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species.

This unit also provides unoccupied habitat for one species: *Cyanea hamatiflora* ssp. *carlsonii.* Designation of this unit is essential to the conservation of this species because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more additional populations necessary to meet the recovery objective of 8 to 10 populations and 300 mature individuals per population for this species throughout its known historical range (see the discussion of conservation requirements in Section D, and in the table for Hawaii T).

This unit contains a total of 1,489 ha (3,681 ac) on State and privately owned lands. This unit is in the Kiilae watershed contains a portions of the South Kona Forest Reserve. Natural features of this unit include portions of the Lava Flow of 1950.

Table for Hawaii T

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Cyanea hamatiflora ssp. carlsonii	X	X			X	X	X			X					
Cyanea stictophylla	X	X			X		X			X					

Hawaii U

The proposed unit Hawaii U provides occupied habitat for one species: *Cyanea hamatiflora* ssp. *carlsonii.* It is proposed for designation because it contains the physical and biological features that are considered essential for the conservation of *Cyanea hamatiflora* ssp. *carlsonii* on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for this species and 300 mature individuals per population throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii U).

This unit contains a total of 615 ha (1,520 ac) on Federal land. This unit is in the Kiilae watershed and lies in a portion of the Hakalau Forest National Wildlife Refuge, Kona Unit. There are no named natural features of this unit.

Table for Hawaii U

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Cyanea hamatiflora ssp. carlsonii	X	X			X	X	X			X					

Hawaii V

The proposed unit Hawaii V provides occupied habitat for one species: *Nothocestrum breviflorum.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 100 mature individuals per population for *Nothocestrum breviflorum* throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii V).

This unit contains a total of 951 ha (2,351 ac) on privately owned land. This unit is in the Kiilae watershed in the south and Kealakekua watershed in the north. this unit has no named natural features.

Table for Hawaii V

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Nothocestrum breviflorum	X	X			X	X	X	X	X						

Hawaii W

The proposed unit Hawaii W provides occupied habitat for one species: *Delissea undulata.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population for *Delissea undulata* throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species.

This unit also provides unoccupied habitat for one species: *Solanum incompletum.* Designation of this unit is essential to the conservation of this species because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more additional populations necessary to meet the recovery objectives of 8 to 10 populations and 300 mature individuals per population for *Solanum incompletum* throughout its known historical range (see the discussion of conservation requirements in Section D, and in the table for Hawaii W).

This unit contains a total of 1,479 ha (3,654 ac) on private land. This unit lies in the Waiaha watershed. The natural area of this unit includes Puu Lehua and a portion of Kipuka Paluli.

Table for Hawaii W

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Delissea undulata	X		X		X	X				X			X*		*Dry cinder cones
Solanum incompletum	X*			X	X	X	X			X					*Not enough suitable habitat for 8 - 10 (unable to identify suitable habitat on other islands in historical range).

Hawaii X

The proposed unit Hawaii X provides occupied habitat for one species: *Cyanea hamatiflora* ssp. *carlsonii.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population for *Cyanea hamatiflora* ssp. *carlsonii* throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii X).

This unit contains a total of 138 ha (340 ac) on State owned lands. This unit is in the Waiaha watershed and contains a portion of the Honuaula Forest Reserve. There are no named natural features in this unit, though it lies southwest of Puu Laalaau.

Table for Hawaii X

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Cyanea hamatiflora ssp. carlsonii	X	X			X	X	X			X					

Hawaii Y

The proposed unit Hawaii Y (subunits Y1 and Y2) provides occupied habitat for two species: *Isodendrion pyrifolium* and *Neraudia ovata.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 300 mature individuals per population throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii Y).

This unit cluster contains a total of 546 ha (1,350 ac) on State and privately owned lands. This unit is in the Keahole watershed in the north and the Waiaha watershed in the south and contains a portion of the Honokohau watershed. There are no named natural features in this unit but it lies between the Queen Kaahumanu Highway (in the west) and Palani Road (in the east). It is inland and east of Honokohau Bay and inland and north of Kalani Bay.

Table for Hawaii Y

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Isodendrion pyrifolium	X			X	X	X	X			X					
Neraudia ovata	X	X			X	X	X	X		X					

Hawaii Z

The proposed unit Hawaii Z provides occupied habitat for 12 species: *Bonamia menziesii, Colubrina oppositifolia, Cyanea stictophylla, Delissea undulata, Flueggea neowawraea, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Nothocestrum breviflorum, Phyllostegia velutina, Plantago hawaiensis, Pleomele hawaiiensis,* and *Zanthoxylum dipetalum* var. *tomentosum.* It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Colubrina oppositifolia, Flueggea neowawraea, Hibiscadelphus hualalaiensis, Nothocestrum breviflorum, Pleomele hawaiiensis,* and *Zanthoxylum dipetalum* var. *tomentosum,* or 300 mature individuals per population for *Bonamia menziesii, Cyanea stictophylla, Delissea undulata, Hibiscus brackenridgei, Phyllostegia velutina,* and *Plantago hawaiensis,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii Z).

This unit contains a total of 10,738 ha (26,535 ac) on State and privately owned lands. This unit is predominately in the Kiholo watershed in the north with portions in the Honokohau, Keahole, and Waiaha in the southwest. This unit also contains most of the Puu Waawaa Wildilfe Sanctuary. The natural features of this unit include Hinakapoula (summit), Kalulu (summit), Kaupulehu Crater, Kileo (summit), Poohohoo (summit), Puu Huluhulu, Puu Iki, Puu Paha, and Puu Waawaa.

Table for Hawaii Z

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Bonamia menziesii	X*		X		X	X	X			X					*Species is wide ranging, each island was probably one large, population (may have been a couple of meta-populations on each island).
Colubrina oppositifolia	X*		X		X	X	X	X	X						*Species is wide ranging, each island was probably one large, population.
Cyanea stictophylla	X	X			X		X			X					
Delissea undulata	X		X		X	X				X			X*		*Dry cinder cones

Flueggea neowawraea	X*		X		X	X	X	X	X						*Species is wide ranging, each island was probably one large, population.
Hibiscadelphus hualalaiensis	X*	X			X	X			X			X	X**	X	*Not enough suitable habitat exists for 8 to 10 populations at this time. **Rocky substrate in deep soils.
Hibiscus brackenridgei	X*		X		X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.
Nothocestrum breviflorum	X*	X			X	X	X	X	X						*Species is wide ranging.‡
Phyllostegia velutina	X	X			X	X	X	X		X					
Plantago hawaiensis	X*	X			X	X	X			X					*Species is wide ranging.‡
Pleomele hawaiiensis	X*	X			X	X	X		X						*Species is wide ranging.
Zanthoxylum dipetalum ssp. tomentosum	X*	X			X	X	X		X			X			*Species is wide ranging.

Hawaii AA

The proposed unit Hawaii AA provides occupied habitat for 10 species: *Asplenium fragile* var *insulare, Hedyotis coriacea, Neraudia ovata, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense*. It is proposed for designation because it contains the physical and biological features that are considered essential for their conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations for each species and 100 mature individuals per population for *Zanthoxylum hawaiiense,* or 300 mature individuals per population for *Asplenium fragile* var *insulare, Hedyotis coriacea, Neraudia ovata, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis,* and *Tetramolopium arenarium,* throughout their known historical range considered by the recovery plans to be necessary for the conservation of each species (see the discussion of conservation requirements in Section D, and in the table for Hawaii AA).

This unit contains a total of 28,384 ha (70,138 ac) on State, Federal, and privately owned lands and land under Federal jurisdiction. This unit lies predominately in the Pohakuloa watershed with the western edge in the Kiholo watershed. This unit also contains a small portion of the Mauna Loa Forest Reserve and the Mauna Loa Forest Reserve and portions of the Pohakuloa Training Area The natural features of this unit include Kipuka Alala, Kipuka Kalawamauna, Lava Flow of 1843, Naohueleelua (summit), Puu Ka Pele, Puu Kea, Puu Keekee, Puuahi, and Waikahalulu Gulch.

Table for Hawaii AA

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Asplenium fragile var. insulare	X*		X		X	X		X		X			X**		*Species is wide ranging.‡ ** Big, moist lava tubes (from 3.05 m to 4.57 m (10 to 15 ft) in diameter), pits, deep cracks, and lava tree molds, with at least a moderate soil or ash accumulation
Hedyotis coriacea	X		X		X	X				X			X*		*Geologically young (<3,000 years old) Mauna Loa pahoehoe lava.
Neraudia ovata	X	X			X	X	X	X		X					
Portulaca sclerocarpa	X*		X		X	X	X			X					*Species is wide ranging.‡

Silene hawaiiensis	X*	X			X	X	X			X					*Species is wide ranging.‡
Silene lanceolata	X		X		X	X	X			X					
Solanum incompletum	X*			X	X	X	X			X					*Not enough suitable habitat for 8 - 10 (unable to identify suitable habitat on other islands in historical range).
Spermolepis hawaiiensis	X*		X		X	X	X				X				*Species is wide ranging.‡
Tetramolopium arenarium	X*			X	X	X	X			X					*Not enough suitable habitat for 8 to 10 pops
Zanthoxylum hawaiiense	X*		X		X	X	X	X	X						*Species is wide ranging, each island was probably one large, population.

Hawaii BB

The proposed unit Hawaii BB provides occupied habitat for one species: *Sesbania tomentosa.* It is proposed for designation because it contains the physical and biological features that are considered essential for its conservation on the island of Hawaii, and provides habitat to support 1 or more of the 8 to 10 populations and 300 mature individuals per population for *Sesbania tomentosa* throughout its known historical range considered by the recovery plan to be necessary for the conservation of this species (see the discussion of conservation requirements in Section D, and in the table for Hawaii BB).

This unit contains a total of 43 ha (106 ac) on State owned land. This unit lies in the Keahole watershed along the coast and contains a portion of Kekaha State Park. There are no named natural features in this unit but it lies between Mahaiula Bay and Makolea Point.

Table for Hawaii BB

Species	1. 8–10 pop. guidelines.	2. Island endemic.	3. Multi-island/current other islands.	4. Multi-island/no current other islands.	5. Non-viable populations.	6. Several occ. vulnerable to destruction.	7. Species with variable habitats.	8. Not all occupied habitat needed.	9. Long-lived perennial–100/pop.	10. Short-lived perennial–300/pop.	11. Annual–500/pop.	12. Narrow endemic.	13. Restricted habitat requirements.	14. Hybridization is possible.	Notes
Sesbania tomentosa	X*		X		X	X	X	X		X					*Species is wide ranging, each island was probably one large, population.

Effects of Critical Habitat Designation

Section 7 Consultation

Section 7(a) of the Act requires Federal agencies, including the Service, to ensure that actions they fund, authorize, or carry out do not destroy or adversely modify critical habitat. Destruction or adverse modification of critical habitat occurs when a Federal action directly or indirectly alters critical habitat to the extent it appreciably diminishes the value of critical habitat for the conservation of the species. Individuals, organizations, States, local governments, and other non-Federal entities are affected by the designation of critical habitat only if their actions occur on Federal lands, require a Federal permit, license, or other authorization, or involve Federal funding.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is designated or proposed. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) of the Act requires Federal agencies to confer with us on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. Conference reports provide conservation recommendations to assist the agency in eliminating conflicts that may be caused by the proposed action. The conservation recommendations in a conference report are advisory.

We may issue a formal conference report, if requested by the Federal action agency. Formal conference reports include an opinion that is prepared according to 50 CFR 402.14, as if the species was listed or critical habitat was designated. We may adopt the formal conference report as the biological opinion when the species is listed or critical habitat is designated, if no substantial new information or changes in the action alter the content of the opinion (see 50 CFR 402.10(d)).

If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency (action agency) must enter into formal consultation with us. Through this consultation, the Federal action agency would ensure that the permitted actions do not destroy or adversely modify critical habitat.

If we issue a biological opinion concluding that a project is likely to result in the destruction or adverse modification of critical habitat, we also provide reasonable and prudent alternatives to the project, if any are identifiable. Reasonable and prudent alternatives are defined at 50 CFR 402.02 as alternative actions identified during consultation that can be implemented in a manner consistent with the intended purpose of the action, that are consistent with the scope of the Federal agency's legal authority and jurisdiction, that are economically and technologically feasible, and that the Director believes would avoid destruction or adverse modification of critical habitat. Reasonable and prudent alternatives can vary from slight project modifications to extensive redesign or relocation of the project. Costs associated with implementing a reasonable and prudent alternative are similarly variable.

Regulations at 50 CFR 402.16 require Federal agencies to reinitiate consultation on previously reviewed actions under certain circumstance, including instances where critical habitat is subsequently designated and the Federal agency has retained discretionary involvement or control has been retained or is authorized by law. Consequently, some Federal agencies may request reinitiation of consultation or conferencing with us on actions for which formal consultation has been completed if those actions may affect designated critical habitat or adversely modify or destroy proposed critical habitat.

Activities on Federal lands that may affect critical habitat of one or more of the 47 plant species will require Section 7 consultation. Activities on private or State lands requiring a permit from a Federal agency, such as a permit from the U.S. Army Corps of Engineers (Corps) under section 404 of the Clean Water Act (33 U.S.C. 1344 *et seq.*), or a section 10(a)(1)(B) permit from us, or some other Federal action, including funding (*e.g.* from the Federal Highway Administration (FHWA), Federal Aviation Administration (FAA), Federal Emergency Management Agency (FEMA)), permits from the Department of Housing and Urban Development (HUD), activities funded by the U.S. Environmental Protection Agency (EPA), Department of Energy (DOE), or any other Federal agency; regulation of airport improvement activities by FAA; and construction of communication sites licensed by the Federal Communication Commission (FCC) will also continue to be subject to the section 7 consultation process. Federal actions not affecting critical habitat and actions on non-Federal lands that are not federally funded, authorized, or permitted do not require section 7 consultation.

Section 4(b)(8) of the Act requires us to briefly describe and evaluate in any proposed or final regulation that designates critical habitat those activities involving a Federal action that may adversely modify such habitat or that may be affected by such designation. We note that such activities may also jeopardize the continued existence of the species.

Activities that, when carried out, funded, or authorized by a Federal agency, may directly or indirectly destroy or adversely modify critical habitat include, but are not limited to:

(1) Activities that appreciably degrade or destroy the primary constituent elements including but not limited to: overgrazing; maintenance of feral ungulates; clearing or cutting of native live trees and shrubs, whether by burning or mechanical, chemical, or other means (*e.g.,* woodcutting, bulldozing, construction, road building, mining, herbicide application); introducing or enabling the spread of nonnative species; and taking actions that pose a risk of fire.

(2) Activities that alter watershed characteristics in ways that would appreciably reduce groundwater recharge or alter natural, dynamic wetland or other vegetative communities. Such activities may include water diversion or impoundment, excess groundwater pumping, manipulation of vegetation such as timber harvesting, residential and commercial development, and grazing of livestock or horses that degrades watershed values.

(3) Rural residential construction that includes concrete pads for foundations and the installation of septic systems where a permit under section 404 of the Clean Water Act would be required by the Corps.

(4) Recreational activities that appreciably degrade vegetation.

(5) Mining of cinder or sand or other minerals.

(6) Introducing or encouraging the spread of non-native plant species.

(7) Importation of non-native species for research, agriculture, and aquaculture, and the release of biological control agents that would have unanticipated effects on the primary constituent elements of designated critical habitat.

If you have questions regarding whether specific activities will likely constitute adverse modification of critical habitat, contact the Field Supervisor, Pacific Islands Ecological Services Field Office (see **ADDRESSES**

section). Requests for copies of the regulations on listed plants and animals, and inquiries about prohibitions and permits may be addressed to the U.S. Fish and Wildlife Service, Branch of Endangered Species/Permits, 911 N.E. 11th Ave., Portland, OR 97232–4181 (telephone 503/231–2063; facsimile 503/231–6243).

Relationship to Habitat Conservation Plans and Other Planning Efforts

Currently, there are no HCPs that include any of the plant species discussed in this proposal as covered species. In the event that future HCPs covering any of the discussed plant species are developed within the boundaries of designated critical habitat, we will work with applicants to ensure that the HCPs provide for protection and management of habitat areas essential to the conservation of the species. This will be accomplished by either directing development and habitat modification to nonessential areas, or appropriately modifying activities within essential habitat areas so that such activities will not adversely modify the primary constituent elements. The HCP development process would provide an opportunity for more intensive data collection and analysis regarding the use of particular areas by these plant species.

Economic and Other Relevant Impacts

Section 4(b)(2) of the Act requires us to designate critical habitat on the basis of the best scientific and commercial information available and to consider the economic and other relevant impacts of designating a particular area as critical habitat. We may exclude areas from critical habitat upon a determination that the benefits of such exclusions outweigh the benefits of specifying such areas as critical habitat. However, we cannot exclude such areas from critical habitat if the exclusion will result in the extinction of the species concerned. We will conduct an analysis of the economic impacts of designating these areas as critical habitat in light of this proposal and in accordance with recent decisions in the *N.M. Cattlegrowers Ass'n* v. *U.S. Fish and Wildlife Serv.,* 248 F.3d 1277 (10th Cir. 2001) prior to a final determination. The economic analysis will include detailed information on the baseline costs and benefits of the critical habitat designation regardless of whether the costs are coextensive with listing, where such estimates are available. This information on the baseline will allow a fuller appreciation of the economic impacts associated with critical habitat designation. When completed, we will announce the availability of the draft economic analysis with a notice in the **Federal Register**, and we will open a public comment period on the draft economic analysis and re-open the comment period on the proposed rule at that time.

We will utilize the final economic analysis, and take into consideration all comments and information regarding economic or other impacts submitted during the public comment period and any public hearings, if requested, to make final critical habitat designations. We may exclude areas from critical habitat upon a determination that the benefits of such exclusions outweigh the benefits of specifying such areas as part of critical habitat; however, we cannot exclude areas from critical habitat when such exclusion will result in the extinction of the species.

Public Comments Solicited

It is our intent that any final action resulting from this proposal be as accurate and as effective as possible. Therefore, we solicit comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry or any other interested party concerning this proposed rule.

We invite comments from the public that provide information on whether lands within proposed critical habitat are currently being managed to address conservation needs of these listed plants. As stated earlier in this proposed rule, if we receive information that any of the areas proposed as critical habitat are adequately managed, we may delete such areas from the final rule, because they would not meet the definition in section 3(5)(A)(i) of the Act. In determining adequacy of management, we must find that the management effort is sufficiently certain to be implemented and effective so as to contribute to the elimination or adequate reduction of relevant threats to the species.

We are soliciting comment in this proposed rule on whether current land management plans or practices applied within areas proposed as critical habitat adequately address the threat to these listed species.

We are aware that the State of Hawaii and some private landowners are considering the development and implementation of land management plans or agreements that may promote the conservation and recovery of endangered and threatened plant species on the island of Hawaii. We are soliciting comments in this proposed rule on whether current land management plans or practices applied within the areas proposed as critical habitat provide for the conservation of the species by adequately addressing the threats. We are also soliciting comments on whether future development and approval of conservation measures (*e.g.,* HCPs, Conservation Agreements, Safe Harbor Agreements) should be excluded from critical habitat and if so, by what mechanism.

In addition, we are seeking comments on the following:

(1) The reasons why critical habitat for any of these species is prudent or not prudent as provided by section 4 of the Act and 50 CFR 424.12(a)(1);

(2) The reasons why any particular area should or should not be designated as critical habitat for any of these species, as critical habitat is defined by section 3 of the Act (16 U.S.C. 1532 (5));

(3) specific information on the amount, distribution, and quality of habitat for the 47 species and what habitat is essential to the conservation of the species and why;

(4) land use practices and current or planned activities in the subject areas and their possible impacts on proposed critical habitat;

(5) any economic or other impacts resulting from the proposed designations of critical habitat, including any impacts on small entities, energy development, low income households, and local governments;

(6) economic and other potential values associated with designating critical habitat for the above plant species such as those derived from non-consumptive uses (*e.g.,* hiking, camping, birding, enhanced watershed protection, increased soil retention, ''existence values,'' and reductions in administrative costs);

(7) the methodology we might use, under section 4(b)(2) of the Act, in determining if the benefits of excluding an area from critical habitat outweigh the benefits of specifying the area as critical habitat; and

(8) the effects of critical habitat designation on military lands, and how it would affect military activities, particularly military activities at the Pohakuloa Training Area lands on the island of Hawaii. Whether there will be a significant impact on military readiness or national security if we designate critical habitat on these facilities. Whether these facilities should be excluded from the designation under section 4(b)(2) of the Act.

Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address, which

we will honor to the extent allowable by law. There also may be circumstances in which we would withhold a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this request prominently at the beginning of your comment. However, we will not consider anonymous comments. To the extent consistent with applicable law, we will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety. Comments and materials received will be available for public inspection, by appointment, during normal business hours at the above address (see **ADDRESSES** section).

If you wish to comment, you may submit your comments and materials concerning this proposal by any of several methods: You may submit written comments and information to the Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Office, 300 Ala Moana Blvd., P.O. Box 50088, Honolulu, HI 96850–0001. You may hand-deliver comments to our Honolulu Fish and Wildlife Office at the address above. You may send comments by electronic mail (e-mail) to: *FW1PIE_Hawaii_Island_Crithab @r1.fws.gov.* If you submit comments by e-mail, please submit them as an ASCII file and avoid the use of special characters and any form of encryption. Please also include ''Attn: RIN 1018–AH02'' and your name and return address in your e-mail message. If you do not receive a confirmation from the system that we have received your e-mail message, contact us directly by calling our Honolulu Fish and Wildlife Office at telephone number 808/541–3441.

The comment period closes on July 29, 2002. We are seeking comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested parties concerning the proposed rule. For additional information on public hearings see the **DATES** section.

Peer Review

In accordance with our policy published on July 1, 1994 (59 FR 34270), we will seek the expert opinions of at least three appropriate and independent specialists regarding this proposed rule. The purpose of such review is to ensure listing and critical habitat decisions are based on scientifically sound data, assumptions, and analyses. We will send copies of this proposed rule to these peer reviewers immediately following publication in the **Federal Register**. We will invite the peer reviewers to comment, during the public comment period, on the specific assumptions and conclusions regarding the proposed designations of critical habitat.

We will consider all comments and data received during the 60-day comment period on this proposed rule during preparation of a final rulemaking. Accordingly, the final decision may differ from this proposal.

Clarity of the Rule

Executive Order 12866 requires each agency to write regulations and notices that are easy to understand. We invite your comments on how to make this proposed rule easier to understand including answers to questions such as the following: (1) Are the requirements in the proposed rule clearly stated? (2) Does the proposed rule contain technical language or jargon that interferes with the clarity? (3) Does the format of the proposed rule (grouping and order of sections, use of headings, paragraphing, etc.) aid or reduce its clarity? (4) Is the description of the proposed rule in the **SUPPLEMENTARY INFORMATION** section of the preamble helpful in understanding the document? (5) What else could we do to make the proposed rule easier to understand?

Send a copy of any comments that concern how we could make this rule easier to understand to: Office of Regulatory Affairs, Department of the Interior, Room 7229, 1849 C Street, NW, Washington, DC 20240.

Taxonomic Changes

At the time we listed *Delissea undulata*, *Hibiscus brackenridgei*, *Mariscus fauriei*, *Mariscus pennatiformis*, and *Phyllostegia parviflora* we followed the taxonomic treatments in Wagner *et al.* (1990), the widely used and accepted *Manual of the Flowering Plants of Hawaii.* Subsequent to the final listing we became aware of new taxonomic treatments of these species. Due to the court-ordered deadlines we are required to publish this proposal to designate critical habitat on the island of Hawaii before we can prepare and publish a notice of taxonomic changes for these five species. We propose to publish a taxonomic change notice for these five species after we have published the final critical habitat designations on the island of Hawaii.

Required Determinations

Regulatory Planning and Review

In accordance with Executive Order 12866, this document is a significant rule and was reviewed by the Office of Management and Budget (OMB) in accordance with the four criteria discussed below. We are preparing an economic analysis of this proposed action, which will be available for public comment, to determine the economic consequences of designating the specific areas identified as critical habitat. The availability of the draft economic analysis will be announced in the **Federal Register** so that it is available for public review and comments.

a. While we will prepare an economic analysis to assist us in considering whether areas should be excluded pursuant to section 4 of the Act, we do not believe this rule will have an annual economic effect of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State or local governments or communities. Therefore, at this time, we do not believe a cost benefit and economic analysis pursuant to Executive Order 12866 is required. We will revisit this if the economic analysis indicates greater impacts than currently anticipated.

The dates for which the 47 plant species were listed as threatened or endangered can be found in Table 4(b). Consequently, and as needed, we conduct formal and informal section 7 consultations with other Federal agencies to ensure that their actions will not jeopardize the continued existence of these species. Under the Act, critical habitat may not be adversely modified by a Federal agency action. Critical habitat does not impose any restrictions on non-Federal persons unless they are conducting activities funded or otherwise sponsored, authorized, or permitted by a Federal agency (see Table 6).

TABLE 6.—IMPACTS OF CRITICAL HABITAT DESIGNATION FOR 47 PLANTS FROM THE ISLAND OF HAWAII

Categories of activities	Activities potentially affected by species listing only	Additional activities potentially affected by critical habitat designation [1]
Federal Activities Potentially Affected [2].	Activities conducted by the Army Corps of Engineers, Department of Transportation, Department of Defense, Department of Agriculture, Environmental Protection Agency, Federal Emergency Management Agency, Federal Aviation Administration, Federal Communications Commission, Department of Interior activities that require a Federal action (permit, authorization, or funding) and may remove or destroy habitat for these plants by mechanical, chemical, or other means (*e.g.,* overgrazing, clearing, cutting native live trees and shrubs, water diversion, impoundment, groundwater pumping, road building, mining, herbicide application, recreational use etc.) or appreciably decrease habitat value or quality through indirect effects (*e.g.,* edge effects, invasion of exotic plants or animals, fragmentation of habitat).	These same activities carried out by Federal Agencies in designated areas where section 7 consultations would not have occurred but for the critical habitat designation.
Private or other non-Federal Activities Potentially Affected [3].	Activities that require a Federal action (permit, authorization, or funding) and may remove or destroy habitat for these plants by mechanical, chemical, or other means (*e.g.,* overgrazing, clearing, cutting native live trees and shrubs, water diversion, impoundment, groundwater pumping, road building, mining, herbicide application, recreational use etc.) or appreciably decrease habitat value or quality through indirect effects (*e.g.,* edge effects, invasion of exotic plants or animals, fragmentation of habitat).	These same activities carried out by Federal Agencies in designated areas where section 7 consultations would not have occurred but for the critical habitat designation.

[1] This column represents activities potentially affected by the critical habitat designation in addition to those activities potentially affected by listing the species.
[2] Activities initiated by a Federal agency.
[3] Activities initiated by a private or other non-Federal entity that may need Federal authorization or funding.

Section 7 of the Act requires Federal agencies to ensure that they do not jeopardize the continued existence of these species. Based on our experience with these species and their needs, we conclude that most Federal or federally-authorized actions that could potentially cause an adverse modification of the proposed critical habitat would currently be considered as ''jeopardy'' under the Act in areas occupied by the species because consultation would already be required due to the presence of the listed species, and the duty to avoid adverse modification of critical habitat would not trigger additional regulatory impacts beyond the duty to avoid jeopardizing the species. Accordingly, we do not expect the designation of currently occupied areas as critical habitat to have any additional incremental impacts on what actions may or may not be conducted by Federal agencies or non-Federal persons that receive Federal authorization or funding.

The designation of areas as critical habitat where section 7 consultations would not have occurred but for the critical habitat designation (that is, in areas currently unoccupied by the listed species), may have impacts that are not attributable to the species listing on what actions may or may not be conducted by Federal agencies or non-Federal persons who receive Federal authorization or funding. We will evaluate any impact through our economic analysis (under section 4 of the Act; see Economic Analysis section of this rule). Non-Federal persons who do not have a Federal nexus with their actions are not restricted by the designation of critical habitat.

b. We do not believe this rule will create inconsistencies with other agencies' actions. As discussed above, Federal agencies have been required to ensure that their actions not jeopardize the continued existence of the 47 plant species since their listing between 1991 and 1996. For the reasons discussed above, the prohibition against adverse modification of critical habitat would be expected to impose few, if any, additional restrictions to those that currently exist in the proposed critical habitat on currently occupied lands. However, we will evaluate any impact of designating areas where section 7 consultations would not have occurred but for the critical habitat designation through our economic analysis. Because of the potential for impacts on other Federal agency activities, we will continue to review this proposed action for any inconsistencies with other Federal agency actions.

c. We do not expect this proposed rule, if made final, would materially affect entitlements, grants, user fees, loan programs, or the rights and obligations of their recipients. Federal agencies are currently required to ensure that their activities do not jeopardize the continued existence of a listed species, and, as discussed above, we do not anticipate that the adverse modification prohibition, resulting from critical habitat designation will have any incremental effects in areas of occupied habitat on any Federal entitlement, grant, or loan program. We will evaluate any impact of designating areas where section 7 consultation would not have occurred but for the critical habitat designation through our economic analysis.

d. OMB has determined that this rule may raise novel legal or policy issues and, as a result, this rule has undergone OMB review.

Regulatory Flexibility Act (5 U.S.C. 601 et seq.)

Under the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*, as amended by the Small Business Regulatory Enforcement Act (SBREFA) of 1996), whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (*i.e.,* small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the Regulatory Flexibility Act (RFA) to require Federal agencies to provide a statement of the factual basis for certifying that the rule will not have a significant economic effect on a substantial number of small entities. SBREFA also amended the RFA to require a certification statement. In

today's rule, we are certifying that the rule will not have a significant effect on a substantial number of small entities. However, should our economic analysis provide a contrary indication, we will revisit this determination at that time. The following discussion explains our rationale.

According to the Small Business Administration, small entities include small organizations, such as independent non-profit organizations, and small governmental jurisdictions, including school boards and city and town governments that serve fewer than 50,000 residents, as well as small businesses. Small businesses include manufacturing and mining concerns with fewer than 500 employees, wholesale trade entities with fewer than 100 employees, retail and service businesses with less than $5 million in annual sales, general and heavy construction businesses with less than $27.5 million in annual business, special trade contractors doing less than $11.5 million in annual business, and agricultural businesses with annual sales less than $750,000. To determine if potential economic impacts to these small entities are significant, we consider the types of activities that might trigger regulatory impacts under this rule as well as the types of project modifications that may result. In general, the term significant economic impact is meant to apply to a typical small business firm's business operations.

To determine if the rule would affect a substantial number of small entities, we consider the number of small entities affected within particular types of economic activities (*e.g.,* housing development, grazing, oil and gas production, timber harvesting, etc.). We apply the ''substantial number'' test individually to each industry to determine if certification is appropriate. In estimating the numbers of small entities potentially affected, we also consider whether their activities have any Federal involvement; some kinds of activities are unlikely to have any Federal involvement and so will not be affected by critical habitat designation.

Designation of critical habitat only affects activities conducted, funded, or permitted by Federal agencies; non-Federal activities are not affected by the designation. In areas where the species are present, Federal agencies are already required to consult with us under section 7 of the Act on activities that they fund, permit, or implement that may affect *Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum* ssp. *tomentosum,* and *Zanthoxylum hawaiiense.* If these critical habitat designations are finalized, Federal agencies must also consult with us if their activities may affect designated critical habitat. However, in areas where the species are present, we do not believe this will result in any additional regulatory burden on Federal agencies or their applicants because consultation would already be required due to the presence of the listed species, and the duty to avoid adverse modification of critical habitat likely would not trigger additional regulatory impacts beyond the duty to avoid jeopardizing the species.

Even if the duty to avoid adverse modification does not trigger additional regulatory impacts in areas where the species is present, designation of critical habitat could result in an addition economic burden on small entities due to the requirement to reinitiate consultation for ongoing Federal activities. However, since these 47 species were listed (between 1991 and 1996), on the island of Hawaii we have conducted only two formal and 20 informal consultations, 11 of which concerned the Army's Pohakuloa Training Area (PTA), in addition to consultations on Federal grants to State wildlife programs, which do not affect small entities.

One of the two formal consultations involving the 47 species was conducted with the Army regarding the addition of two firing lanes to Range 8 at PTA. *Silene hawaiiensis,* one of the 47 species, was the only listed species addressed in the biological opinion, which concluded that with implementation of the preferred alternative and accompanying mitigation procedures, the project was not likely to jeopardize the continued existence of the species. The other formal consultation was with the Federal Highways Administration (FHWA) on realignment of and improvements to Saddle Road. *Silene hawaiiensis* and the palila (or honeycreeper, *Loxioides bailleui*), a listed bird, were the two species addressed in the biological opinion, which concluded that with the conservation and mitigation measures built into the project by FHWA, the project was not likely to jeopardize the continued existence of the two species and was not likely to adversely modify critical habitat for the palila. Neither of the two formal consultations directly affected or concerned small entities. In both consultations, we concluded that the preferred alternative for the project, with accompanying conservation and mitigation procedures, was not likely to jeopardize the continued existence of the species. The only ongoing project is the Saddle Road realignment, which does not directly affect small entities. Neither of these formal consultations directly affected or concerned small entities, nor does the ongoing project directly affect small entities. As a result, the requirement to reinitiate consultation for ongoing projects will not affect a substantial number of small entities on the island of Hawaii.

Three of the 20 informal consultations that have been conducted on the island of Hawaii concern the National Park Service's Hawaii Volcanoes National Park: one on fence construction to exclude ungulates regarding three of the 47 species (*Asplenium fragile* var. *insulare, Plantago hawaiensis,* and *Silene hawaiiensis*) as well as one listed bird and two listed plants not included in the 47 species in today's rule; one on use of the Marsokhod planetary rover at Kilauea Volcano's summit regarding *Silene hawaiiensis*; and one on outplanting food plants for the endangered Hawaiian nene goose regarding *Sesbania tomentosa* and two listed birds. Four informal consultations were conducted with the Army Corps of Engineers (ACOE): one for the Defense Environmental Restoration Program on removal of unexploded ordnance from the former Waikoloa Maneuver Area regarding *Portulaca sclerocarpa;* one on the Alenaio Stream flood control project in Hilo regarding *Asplenium fragile* var. *insulare* as well as several listed birds and a listed plant not included in today's rule; one for the Multi-Purpose Range Complex at PTA regarding

Asplenium fragile var. *insulare, Hedyotis coriacea, Silene hawaiiensis, Silene lanceolata,* and one listed plant not in today's rule; and one consultation for the Endangered Species Management Plan for PTA regarding eight of the 47 species (*Asplenium fragile* var. *insulare, Hedyotis coriacea, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense*) and three listed plants not in today's rule. Eleven informal consultations were conducted with the Army concerning PTA: three on archery hunts regarding *Silene hawaiiensis* and three listed plants not in today's rule; one on a grenade machine gun range regarding *Asplenium fragile* var. *insulare* and *Silene hawaiiensis*; one on a quarry rock crusher regarding *Silene hawaiiensis* and a listed plant not in today's rule; one on the proposed acquisition of a Parker Ranch parcel regarding *Silene lanceolata* and a listed plant not in today's rule; one on military training regarding *Hedyotis coriacea, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense;* two on threats to rare plants from feral ungulates regarding eight of the 47 species (*Asplenium fragile* var. *insulare, Hedyotis coriacea, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense*) as well as three listed plants not in today's rule; one on the Ecosystem Management Plan regarding nine of the 47 species (*Asplenium fragile* var. *insulare, Hedyotis coriacea, Neraudia ovata, Portulaca sclerocarpa, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Tetramolopium arenarium,* and *Zanthoxylum hawaiiense*) as well as the listed Hawaiian hoary bat and two listed plants not in today's rule; and one consultation concerning PTA's Ecosystem Management Plan, Endangered Species Management Plan, and Fire Management Plan regarding the same nine species, bat, and two listed plants referred to just above. Two informal consultations were conducted with the Federal Highways Administration on Kealakehe Parkway construction regarding four of the 47 species (*Isodendrion pyrifolium, Mariscus fauriei, Nothocestrum breviflorum,* and *Pleomele hawaiiensis*) as well as one listed plant not included in the 47 species in today's rule and *Pritchardia affinis,* for which we determine that the designation of critical habitat is not prudent in today's rule.

None of these informal consultations directly affected or concerned small entities. In all 20 informal consultations, we concurred with each agency's determination that the project, as proposed or modified, was not likely to adversely affect listed species. The only ongoing projects are Kealakehe Parkway and those concerning military training and management plans at PTA, which do not directly affect small entities. None of these consultations directly affected or concerned small entities, and none of the ongoing projects directly affect small entities. Only a small percentage of the small entities would be affected indirectly. As a result, the requirement to reinitiate consultation for ongoing projects will not affect a substantial number of small entities on the island of Hawaii.

In areas where the species is clearly not present, designation of critical habitat could trigger additional review of Federal activities under section 7 of the Act that would otherwise not be required. Other than on military lands, notably the Army's PTA, Hawaii Volcanoes National Park, and construction for Saddle Road and Kealakehe Parkway, we are aware of few activities in the proposed critical habitat areas for these 47 plants that have Federal involvement, and thus, would require consultation or reinitiation of already completed consultations for ongoing projects. As mentioned above, we have conducted only two formal and 20 informal consultations under section 7 involving any of the species, most of them concerning PTA. As a result, other than for PTA, Hawaii Volcanoes National Park, Saddle Road, and Kealakehe, we cannot easily identify future consultations that may be due to the listing of the species or the increment of additional consultations that may be required by this critical habitat designation. Therefore, for the purposes of this review and certification under the Regulatory Flexibility Act, we are assuming that, with those exceptions, future consultations in the area proposed as critical habitat will be due to the critical habitat designations.

On the island of Hawaii, approximately 33 percent of the designations are on Federal lands, 51 percent are on State lands, and 16 percent are on private lands. Most of the land within the critical habitat units will have limited suitability for development, land uses, and activities because of the rather remote locations, limited access, and rugged terrain of these lands. Also, most of this land (84 percent) is within the State Conservation District where State land-use controls severely limit development and most activities. Approximately 16 percent of this land is within the State Agricultural District where only activities such as crops, livestock, grazing, and accessory structures and farmhouses are allowed. The majority of this land is under State ownership or large estates that do not qualify as small entities. Less than 1 percent of this land is within the State Urban District where land use and development (commercial, industrial, residential, etc.) are subject to the county community plans, zoning, building code regulations, and land-use regulations. On non-Federal lands, activities that lack Federal involvement would not be affected by the critical habitat designations. Activities of an economic nature that are likely to occur on non-Federal lands in the area encompassed by these proposed designations consist of improvements in State parks and communications and tracking facilities; road improvements; recreational use such as hiking, camping, picnicking, game hunting, fishing; and ranching, and crop farming. With the exception of communications and tracking facilities improvements by the Federal Aviation Administration or the Federal Communications Commission and road improvements by FHWA, these activities are unlikely to have Federal involvement. On lands that are in agricultural production, the types of activities that might trigger a consultation include irrigation ditch system projects that may require section 404 authorizations from the Army Corps of Engineers (ACOE), and watershed management and restoration projects sponsored by NRCS. However, the NRCS restoration projects typically are voluntary, and irrigation ditch system projects within lands that are in agricultural production are rare, and may affect only a small percentage of the small entities within these proposed critical habitat designations.

Lands that are within the State Urban District are located almost exclusively within undeveloped coastal areas. The types of activities that might trigger a consultation include shoreline restoration or modification projects that may require section 404 authorizations from the ACOE or Federal Emergency Management Agency, housing or resort development that may require permits from the Department of Housing and Urban Development, and activities funded or authorized by the Environmental Protection Agency. However, we are not aware of a significant number of future activities that would require federal funds,

permits, or authorizations in these coastal areas. Therefore, we conclude that the proposed rule would not affect a substantial number of small entities.

Even if a substantial number of small entities were affected by the consultation requirements of the Act, which we believe would be highly unlikely based on the past consultation history for these 47 species, and based on our experience with section 7 consultations for all listed species, virtually all projects—including those that, in their initial proposed form, would result in jeopardy or adverse modification determinations in section 7 consultations—can be implemented successfully with, at most, the adoption of reasonable and prudent alternatives. These measures must be economically feasible and within the scope of authority of the Federal agency involved in the consultation (see 50 CFR 404.2, definition of reasonable and prudent alternatives). Therefore, such measures are not likely to result in a significant economic impact to a substantial number of small entities.

As required under section 4(b)(2) of the Act, we will conduct an analysis of the potential economic impacts of this proposed critical habitat designation, and will make that analysis available for public review and comment before finalizing these designations. However, court deadlines require us to publish this proposed rule before the economic analysis can be completed.

In summary, we have considered whether this proposed rule would result in a significant economic effect on a substantial number of small entities. It would not affect a substantial number of small entities. Approximately 51 percent of the lands proposed as critical habitat are on State of Hawaii lands. The State of Hawaii is not a small entity. Approximately 16 percent of the lands proposed as critical habitat are on private lands, the majority owned by large estates that do not qualify as small entities. Many of the private parcels are located in areas where likely future land uses are not expected to result in Federal involvement or section 7 consultations. Most of the private and State parcels within the proposed designation are currently being used for recreational and agricultural purposes and, therefore, are not likely to require any Federal authorization. In the remaining areas, section 7 application, the only trigger for economic regulatory impact under this rule, would be limited to a subset of the area proposed. The most likely future section 7 consultations resulting from this rule would be for informal consultations on military training activities, federally funded highway construction, federally funded land and water conservation projects, species-specific surveys and research projects, and watershed management and restoration projects sponsored by NRCS. These consultations would likely occur on only a subset of the total number of parcels and therefore would not likely affect a substantial number of small entities. This rule would result in project modifications only when proposed Federal activities would destroy or adversely modify critical habitat. While this may occur, it is not expected frequently enough to affect a substantial number of small entities. Even when it does occur, we do not expect it to result in a significant economic impact, as the measures included in reasonable and prudent alternatives must be economically feasible and consistent with the proposed action. Therefore, we are certifying that the proposed designation of critical habitat for the following species: *Achyranthes mutica, Adenophorus periens, Argyroxiphium kauense, Asplenium fragile* var. *insulare, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Diellia erecta, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum* ssp. *tomentosum,* and *Zanthoxylum hawaiiense* will not have a significant economic impact on a substantial number of small entities, and an initial regulatory flexibility analysis is not required. However, should the economic analysis of this rule indicate otherwise, we will revisit this determination.

Executive Order 13211

On May 18, 2001, the President issued Executive Order 13211 on regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. Although this rule is a significant regulatory action under Executive Order 12866, it is not expected to significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action and no Statement of Energy Effects is required.

Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq.*):

(a) We believe this rule, as proposed, will not ''significantly or uniquely'' affect small governments. A Small Government Agency Plan is not required. Small governments will be affected only to the extent that they have any programs requiring Federal funds, permits or other authorizations. Any such activities will require that the Federal agency ensure that the action will not adversely modify or destroy designated critical habitat. However, as discussed above, these actions are currently subject to equivalent restrictions through the listing protections of the species, and no further restrictions are anticipated to result from critical habitat designation of occupied areas. In our economic analysis, we will evaluate any impact of designating areas where section 7 consultations would not have occurred but for the critical habitat designation.

(b) This rule, as proposed, will not produce a Federal mandate on State or local governments or the private sector of $100 million or greater in any year, that is, it is not a ''significant regulatory action'' under the Unfunded Mandates Reform Act. The designation of critical habitat imposes no obligations on State or local governments.

Takings

In accordance with Executive Order 12630 (''Government Actions and Interference with Constitutionally Protected Private Property Rights''), we have analyzed the potential takings implications of designating critical habitat for the 47 species from the island of Hawaii in a preliminary takings implications assessment. The takings implications assessment concludes that this proposed rule does not pose significant takings implications. Once the economic analysis is completed for this proposed rule, we will review and revise this preliminary assessment as warranted.

Federalism

In accordance with Executive Order 13132, the proposed rule does not have significant Federalism effects. A Federalism assessment is not required. In keeping with Department of Interior policy, we requested information from appropriate State agencies in Hawaii. The designation of critical habitat in areas currently occupied by one or more of the 47 plant species imposes no additional restrictions to those currently in place, and, therefore, has little incremental impact on State and local governments and their activities. The designation of critical habitat in unoccupied areas may require section 7 consultation on non Federal lands (where a Federal nexus occurs) that might otherwise not have occurred. However, there will be little additional impact on State and local governments and their activities because all but one unit and four subunits of the proposed critical habitat areas are occupied by at least one species. The designations may have some benefit to these governments in that the areas essential to the conservation of these species are more clearly defined, and the primary constituent elements of the habitat necessary to the survival of the species are specifically identified. While this definition and identification does not alter where and what federally sponsored activities may occur, it may assist these local governments in long range planning, rather than waiting for case-by-case section 7 consultation to occur.

Civil Justice Reform

In accordance with Executive Order 12988, the Office of the Solicitor has determined that the rule does not unduly burden the judicial system and does meet the requirements of sections 3(a) and 3(b)(2) of the Order. We are proposing to designate critical habitat in accordance with the provisions of the Endangered Species Act. The rule uses standard property descriptions and identifies the primary constituent elements within the designated areas to assist the public in understanding the habitat needs of the 47 plant species.

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This rule does not contain any new collections of information that require approval by OMB under the Paperwork Reduction Act. This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

We have determined we do not need to prepare an Environmental Assessment and/or an Environmental Impact Statement as defined by the National Environmental Policy Act of 1969 in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act, as amended. We published a notice outlining our reason for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244). This proposed determination does not constitute a major Federal action significantly affecting the quality of the human environment.

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951) Executive Order 13175 and 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized federal Tribes on a government-to-government basis. We have determined that there are no Tribal lands essential for the conservation of these 47 plant species. Therefore, designation of critical habitat for these 47 species has not been proposed on Tribal lands.

References Cited

A complete list of all references cited in this proposed rule is available upon request from the Pacific Islands Office (see **ADDRESSES** section).

Authors

The primary authors of this notice are Gregory Koob, Christa Russell, Michelle Stephens, and Marigold Zoll (see **ADDRESSES** section).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Proposed Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

2. In § 17.12(h) revise the entries for ''*Achyranthes mutica, Argyroxiphium kauense, Bonamia menziesii, Clermontia drepanomorpha, Clermontia lindseyana, Clermontia peleana, Clermontia pyrularia, Colubrina oppositifolia, Cyanea hamatiflora* ssp. *carlsonii, Cyanea platyphylla, Cyanea shipmanii, Cyanea stictophylla, Cyrtandra giffardii, Cyrtandra tintinnabula, Delissea undulata, Flueggea neowawraea, Gouania vitifolia, Hedyotis coriacea, Hibiscadelphus giffardianus, Hibiscadelphus hualalaiensis, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion hosakae, Isodendrion pyrifolium, Mariscus fauriei, Melicope zahlbruckneri, Neraudia ovata, Nothocestrum breviflorum, Phyllostegia racemosa, Phyllostegia velutina, Phyllostegia warshaueri, Plantago hawaiensis, Pleomele hawaiiensis, Portulaca sclerocarpa, Sesbania tomentosa, Sicyos alba, Silene hawaiiensis, Silene lanceolata, Solanum incompletum, Spermolepis hawaiiensis, Tetramolopium arenarium, Vigna o-wahuensis, Zanthoxylum dipetalum* var. *tomentosum, and Zanthoxylum hawaiiense*'' under ''*FLOWERING PLANTS*'' *and* ''*Adenophorus periens, Asplenium fragile* var. *insulare,* and *Diellia erecta*'' under ''FERNS AND ALLIES'' to read as follows:

§ 17.12 Endangered and threatened plants.

* * * * *

(h) * * *

Species		Historic range	Family name	Status	When listed	Critical habitat	Special rules
Scientific name	Common name						
Flowering Plants.							

Species		Historic range	Family name	Status	When listed	Critical habitat	Special rules
Scientific name	Common name						
*	*	*	*	*	*		*
Achyranthes mutica	None	U.S.A. (HI)	Amaranthaceae	E	592	17.96A(a)	NA
*	*	*	*	*	*		*
Argyroxiphium kauense.	Mauna Loa silversword.	U.S.A. (HI)	Asteraceae	E	497	17.96A(a)	NA
*	*	*	*	*	*		*
Bonamia menziesii	None	U.S.A. (HI)	Convolvulaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Clermontia drepanomorpha.	Oha wai	U.S.A. (HI)	Campanulaceae	E	595	17.96A(a)	NA
Clermontia lindseyana.	Oha wai	U.S.A. (HI)	Campanulaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Clermontia peleana	Oha wai	U.S.A. (HI)	Campanulaceae	E	532	17.96A(a)	NA
Clermontia pyrularia	Oha wai	U.S.A. (HI)	Campanulaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Colubrina oppositifolia.	Kauila	U.S.A. (HI)	Rhamnaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Cyanea hamatiflora ssp. *carlsonii*.	Haha	U.S.A. (HI)	Campanulaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Cyanea platyphylla	Haha	U.S.A. (HI)	Campanulaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Cyanea shipmanii	Haha	U.S.A. (HI)	Campanulaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Cyanea stictophylla	Haha	U.S.A. (HI)	Campanulaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Cyrtandra giffardii	Haiwale	U.S.A. (HI)	Gesneriaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Cyrtandra tintinnabula.	Haiwale	U.S.A. (HI)	Gesneriaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Delissea undulata	None	U.S.A. (HI)	Campanulaceae	E	593	17.96A(a)	NA
*	*	*	*	*	*		*
Flueggea neowawraea.	Mehamehame	U.S.A. (HI)	Euphorbiaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Gouania vitifolia	None	U.S.A. (HI)	Rhamnaceae	E	541	17.96A(a)	NA
*	*	*	*	*	*		*
Hedyotis coriacea	Kioele	U.S.A. (HI)	Rubiaceae	E	467	17.96A(a)	NA
*	*	*	*	*	*		*
Hibiscadelphus giffardianus.	Hau kuahiwi	U.S.A. (HI)	Malvaceae	E	595	17.96A(a)	NA
Hibiscadelphus hualalaiensis.	Hau kuahiwi	U.S.A.(HI)	Malvaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Hibiscus brackenridgei.	Mao hau hele	U.S.A. (HI)	Malvaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Ischaemum byrone	Hilo ischaemum	U.S.A. (HI)	Poaceae	E	532	17.96A(a)	NA
Isodendrion hosakae	Aupaka	U.S.A. (HI)	Violaceae	E	414	17.96A(a)	NA

Species		Historic range	Family name	Status	When listed	Critical habitat	Special rules
Scientific name	Common name						
*	*	*	*	*	*		*
Isodendrion pyrifolium.	Wahine noho kula	U.S.A. (HI)	Violaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Mariscus fauriei	None	U.S.A. (HI)	Cyperaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Melicope zahlbruckneri.	Alani	U.S.A. (HI)	Rutaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Neraudia ovata	None	U.S.A. (HI)	Urticaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Nothocestrum breviflorum.	Aiea	U.S.A. (HI)	Solanaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Phyllostegia racemosa.	Kiponapona	U.S.A. (HI)	Lamiaceae	E	595	17.96A(a)	NA
Phyllostegia velutina	None	U.S.A. (HI)	Lamiaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Phyllostegia warshaueri.	None	U.S.A. (HI)	Lamiaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Plantago hawaiensis	Laukahi kuahiwi	U.S.A. (HI)	Plantaginaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Pleomele hawaiiensis.	Halapepe	U.S.A. (HI)	Liliaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Portulaca sclerocarpa.	Poe	U.S.A. (HI)	Portulacaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Sesbania tomentosa	Ohai	U.S.A. (HI)	Fabaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Sicyos alba	Anunu	U.S.A. (HI)	Cucurbitaceae	E	595	17.96A(a)	NA
*	*	*	*	*	*		*
Silene hawaiiensis	None	U.S.A. (HI)	Caryophyllaceae	T	532	17.96A(a)	NA
Silene lanceolata	None	U.S.A. (HI)	Caryophyllaceae	E	480	17.96A(a)	NA
*	*	*	*	*	*		*
Solanum incompletum.	Popolo ku mai	U.S.A. (HI)	Solanaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Spermolepis hawaiiensis.	None	U.S.A. (HI)	Apiaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Tetramolopium arenarium.	None	U.S.A. (HI)	Asteraceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*
Vigna o-wahuensis	None	U.S.A. (HI)	Fabaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Zanthoxylum dipetalum var. *tomentosum*.	Ae	U.S.A. (HI)	Rutaceae	E	595	17.96A(a)	NA
Zanthoxylum hawaiiense.	Ae	U.S.A. (HI)	Rutaceae	E	532	17.96A(a)	NA
*	*	*	*	*	*		*

Ferns and Allies.

Species		Historic range	Family name	Status	When listed	Critical habitat	Special rules
Scientific name	Common name						
Adenophorus periens	Pendant kihi fern	U.S.A. (HI)	Grammitidaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*
Asplenium fragile var. *insulare*.	None	U.S.A. (HI)	Aspleniaceae	E	553	17.96A(a)	NA
*	*	*	*	*	*		*
Diellia erecta	Asplenium-leaved diellia.	U.S.A. (HI)	Aspleniaceae	E	559	17.96A(a)	NA
*	*	*	*	*	*		*

3. Section 17.96, as proposed to be amended at 65 FR 66865, November 7, 2000, 65 FR 79192 (December 18, 2000), 65 FR 82086 (December 27, 2000), 65 FR 83193 (December 29, 2000), 67 FR 4072 (January 28, 2002), 67 FR 9806 (March 4, 2002), 67 FR 15856 (April 3, 2002), 67 FR 16492 (April 5, 2002), and 67 FR 34522 (May 14, 2002) is proposed to be further amended as follows:

a. Add paragraph (a)(1)(i)(H); and

b. Amend paragraph (a)(1)(ii) by adding the entries set forth below.

§ 17.96 Critical habitat-plants.

(a) * * *

(1) * * *

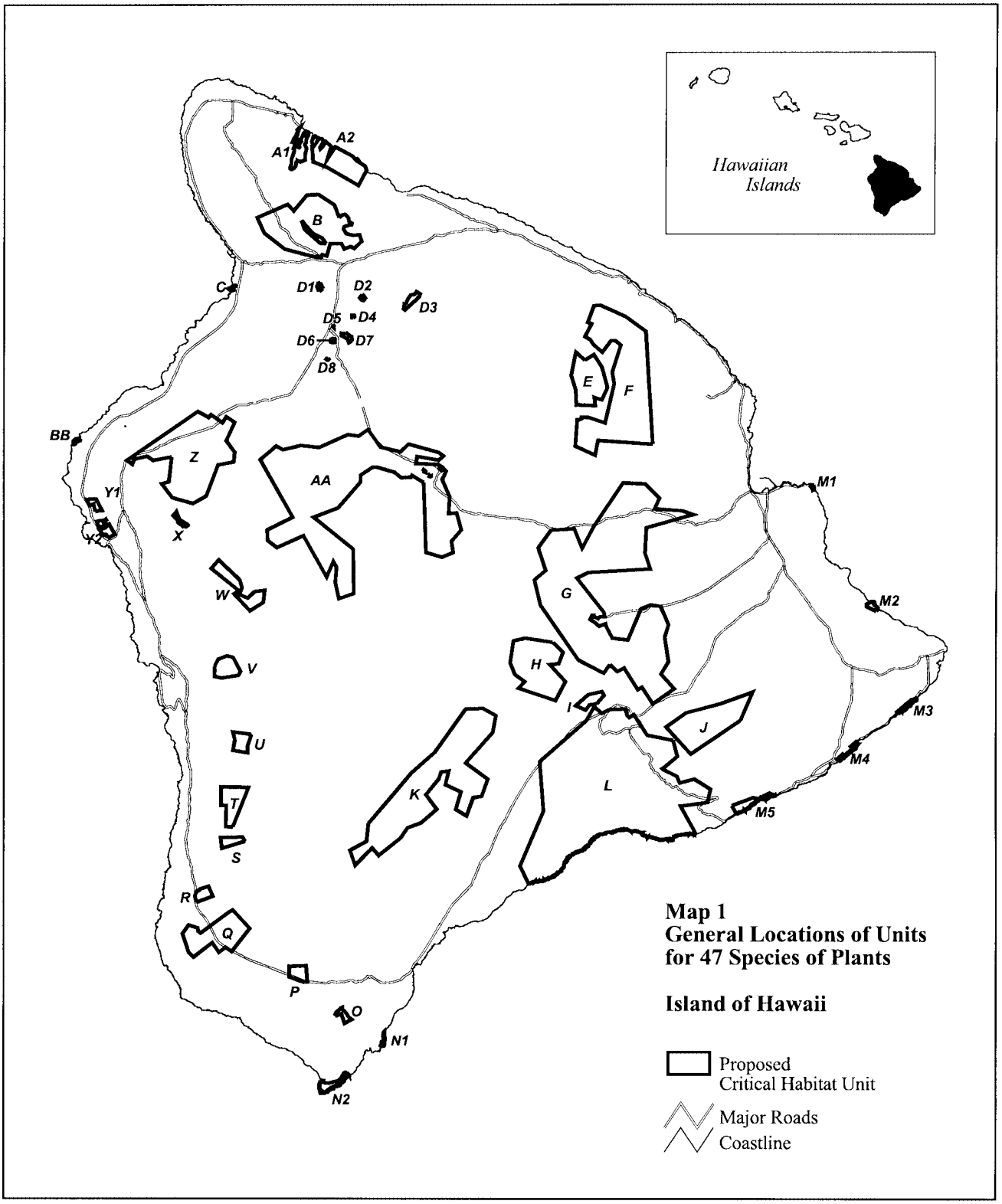
(i) *Maps and critical habitat unit descriptions.* The following sections contain the legal descriptions of the critical habitat units designated for each of the Hawaiian Islands. Existing features and structures within proposed areas, such as buildings, roads, aqueducts, telecommunication equipment, arboreta and gardens, heiaus (indigenous place of worship, shrine), airports, other paved areas, lawns, and other rural residential landscaped areas do not contain one or more of the primary constituent elements described for each species in paragraphs (a)(1)(ii)(A) and (a)(1)(ii)(B) of this section and are not included in the critical habitat designation.

* * * * *

(H) *Hawaii.* Critical habitat units are described below. Coordinates are in UTM Zone 5 with units in meters using North American Datum of 1983 (NAD83). The following map shows the general locations of the 28 critical habitat units designated on the island of Hawaii.

(*1*) **Note:** Map 1—Index map follows:

BILLING CODE 4310–55–P



Map 1
General Locations of Units for 47 Species of Plants

Island of Hawaii

BILLING CODE 4310–55–C

(*2*) Hawaii A1 (719 ha; 1,777 ac).

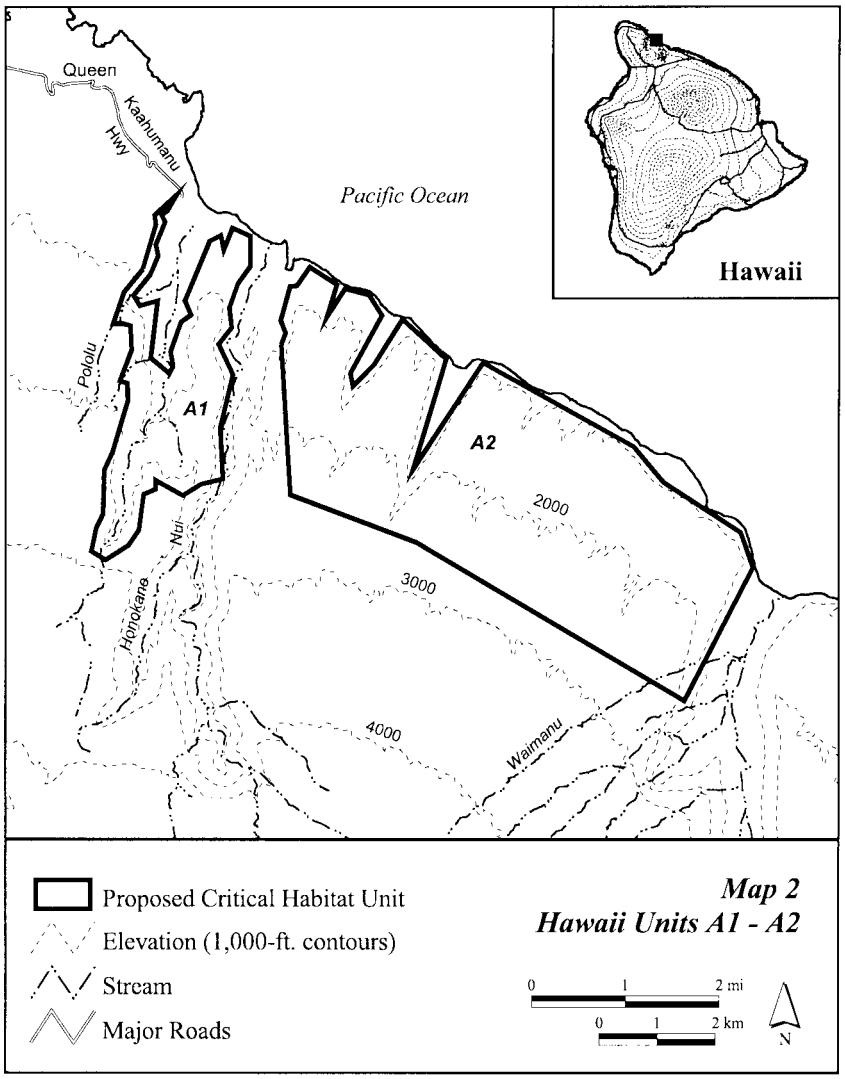
(*i*) Unit consists of the following 56 boundary points: 213645, 2235127; 213646, 2235128; 213870, 2235881; 213849, 2236039; 214231, 2236397; 214073, 2236118; 213966, 2236053; 214027, 2235922; 213874, 2235537; 213912, 2235356; 213779, 2235023; 213495, 2234674; 213594, 2234495; 213903, 2234581; 213784, 2233612; 214109, 2233345; 214171, 2233459; 214131, 2233716; 214311, 2234221; 214471, 2234336; 214374, 2234583; 214789, 2235600; 214978, 2235699; 215036, 2235455; 215183, 2235821; 215492, 2235685; 215490, 2235180; 215280, 2234884; 215136, 2234466; 215169, 2234127; 214956, 2233845; 215193, 2233323; 214983, 2232423; 215030, 2231525; 214643, 2231424; 214338, 2231240; 213870, 2231505; 213870, 2231342; 213666, 2231261; 213585, 2230650; 213402, 2230385; 213015, 2230141; 212772, 2230287; 212852, 2230691; 212976, 2230917; 212994, 2231684; 213137, 2232014; 213401, 2232866; 213381, 2233174; 213259, 2233215; 213454, 2233742; 213434, 2234160; 213320, 2234192; 213137, 2234192; 213320, 2234721; 213645, 2235127.

(*ii*) **Note:** See Map 2.

(*3*) Hawaii A2 (2,685 ha; 6,635 ac).

(*i*) Unit consists of the following 26 boundary points: 216018, 2233828; 216096, 2234031; 216010, 2234247; 216164, 2234825; 216281, 2234837; 216511, 2235154; 216975, 2234861; 216801, 2234306; 217114, 2234782; 217527, 2234678; 217743, 2234334; 217207, 2233347; 217252, 2233124; 217620, 2233502; 218094, 2234265; 218843, 2233587; 218286, 2231694; 219486, 2233520; 222066, 2232085; 222577, 2231460; 223900, 2230601; 224117, 2230006; 222945, 2227734; 218340, 2230439; 216174, 2231252; 216018, 2233828.

(*ii*) **Note:** Map 2 follows:

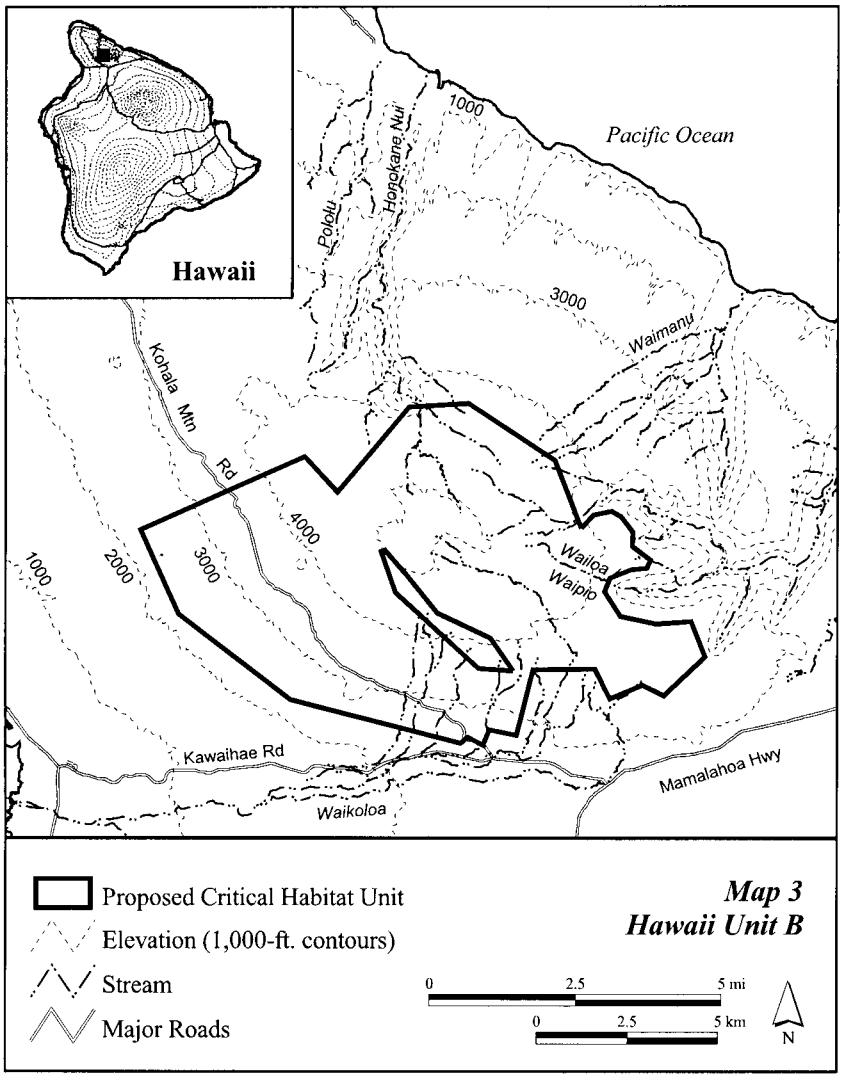


(*3*) Hawaii B (8,200 ha; 20,263 ac).

(*i*) Unit consists of the following 34 boundary points: 220056, 2222994; 220386, 2223366; 220886, 2223462; 221152, 2223319; 221480, 2222888; 221459, 2222499; 221971, 2222131; 221869, 2221906; 221398, 2221865; 220845, 2221639; 220702, 2221271; 221132, 2220595; 222094, 2220390; 223077, 2220452; 223466, 2219489; 222340, 2218424; 221746, 2218711; 220845, 2218342; 220436, 2219154; 218738, 2219136; 218273, 2217335; 217531, 2217496; 217361, 2217075; 216932, 2217289; 216745, 2217118; 212055, 2218324; 208993, 2220657; 207937, 2222955; 212449, 2224975; 213349, 2223996; 215306, 2226356; 216953, 2226452; 219330, 2224881; 220056, 2222994.

(*ii*) Excluding the area bounded by the following 9 boundary points (233 ha, 577 ac): 218184, 2219101; 217244, 2219173; 214943, 2221244; 214556, 2222362; 214657, 2222404; 215168, 2221804; 216111, 2220679; 217554, 2220006; 218184, 2219101.

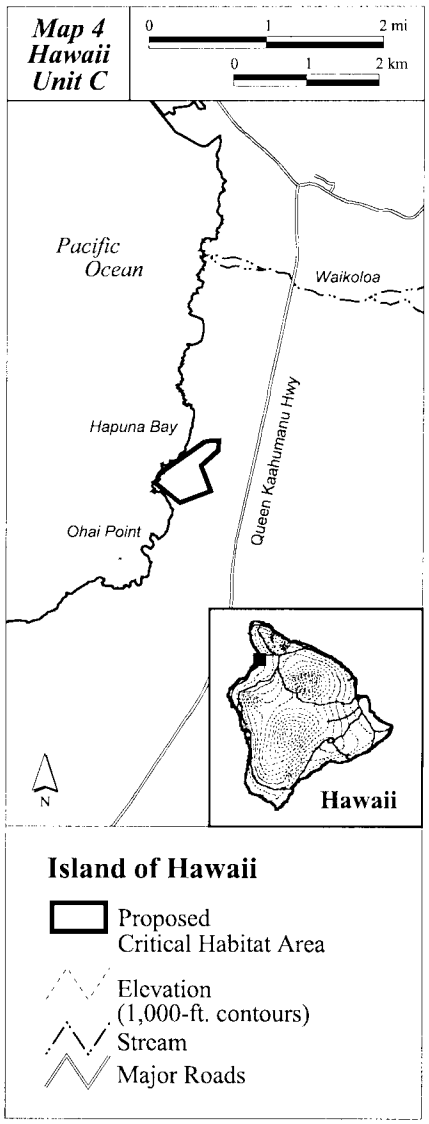
(*iii*) **Note:** Map 3 follows:



(*4*) Hawaii C (38 ha; 94 ac).

(*i*) Unit consists of the following nine boundary points: 204444, 2212965; 204625, 2212973; 204622, 2212839; 204381, 2212624; 204522, 2212274; 204092, 2212117; 203750, 2212397; 203856, 2212544; 204444, 2212965.

(*ii*) **Note:** Map 4 follows:



(*5*) Hawaii D1 (55 ha; 136 ac).

(*i*) Unit consists of the following 12 boundary points: 217658, 2212443; 217347, 2212191; 217122, 2212425; 216974, 2212346; 216772, 2212797; 216930, 2213059; 216918, 2213235; 217016, 2213305; 217161, 2212966; 217379, 2213113; 217624, 2212704; 217658, 2212443.

(*ii*) **Note:** See Map 5.

(*6*) Hawaii D2 (43 ha; 107 ac).

(*i*) Unit consists of the following seven boundary points: 223515, 2211644; 223742, 2211502; 223965, 2211046; 223748, 2210727; 223464, 2210758; 223186, 2211148; 223515, 2211644.

(*ii*) **Note:** See Map 5.

(*7*) Hawaii D3 (257 ha; 636 ac).

(*i*) Unit consists of the following 11 boundary points: 229819, 2210481; 230122, 2210409; 230226, 2210890; 230744, 2211568; 231267, 2211631; 231537, 2212023; 232139, 2211722; 231979, 2211293; 229919, 2209314; 229676, 2209450; 229819, 2210481.

(*ii*) **Note:** See Map 5.

(*8*) Hawaii D4 (14 ha; 34 ac).

(*i*) Unit consists of the following six boundary points: 222195, 2208132; 221960, 2208175; 221965, 2208568; 222290, 2208522; 222369, 2208305; 222195, 2208132.

(*ii*) **Note:** See Map 5.

(*9*) Hawaii D5 (1 ha; 4 ac).

(*i*) Unit consists of the following eight boundary points: 219313, 2206792; 219277, 2206743; 219217, 2206755; 219211, 2206878; 219245, 2206912; 219279, 2206913; 219313, 2206868; 219313, 2206792.

(*ii*) **Note:** See Map 5.

(*10*) Hawaii D6 (36 ha; 89 ac).

(*i*) Unit consists of the following eight boundary points: 219524, 2204639; 219285, 2204460; 218903, 2204552; 218798, 2204662; 218872, 2205006; 219122, 2205138; 219438, 2205062; 219524, 2204639.

(*ii*) **Note:** See Map 5.

(*11*) Hawaii D7 (112 ha; 278 ac).

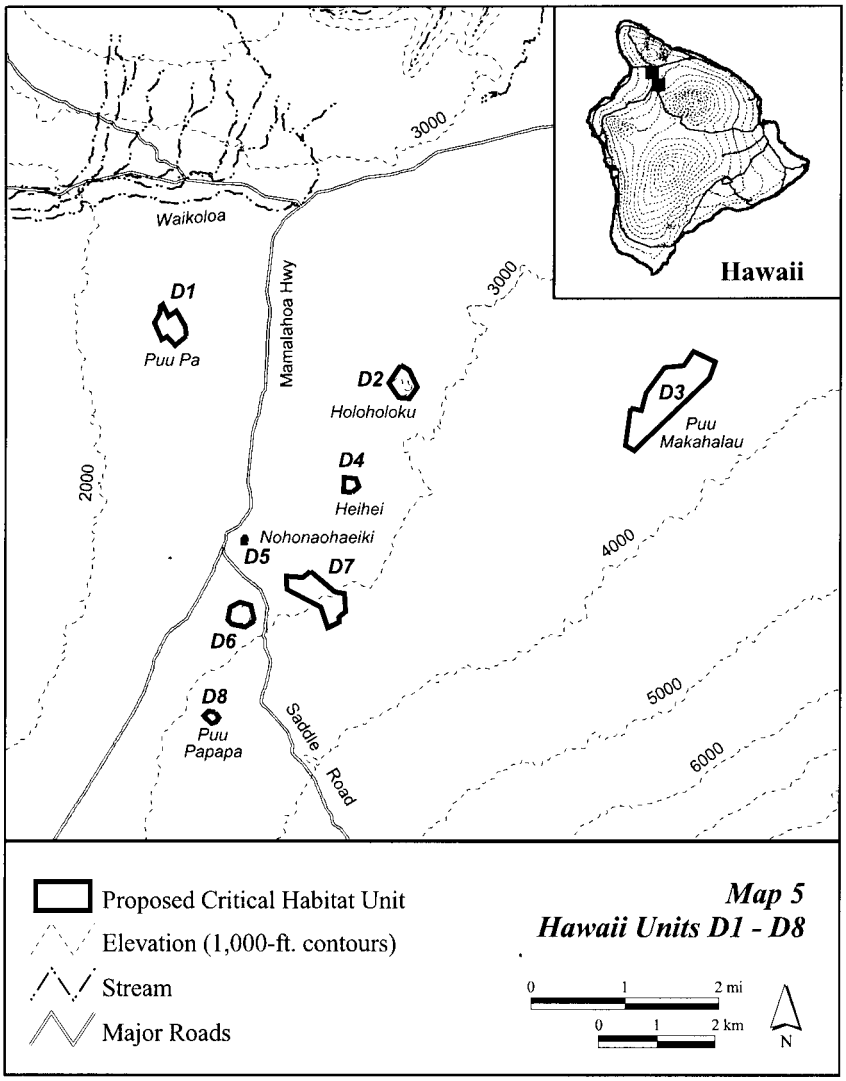
(*i*) Unit consists of the following 12 boundary points: 221058, 2205989; 221716, 2205427; 221986, 2205377; 222020, 2204891; 221830, 2204740; 221852, 2204603; 221531, 2204445; 221346, 2205006; 220421, 2205505; 220400, 2205861; 220861, 2205816; 221058, 2205989.

(*ii*) **Note:** See Map 5.

(*12*) Hawaii D8 (8 ha; 21 ac).

(*i*) Unit consists of the following seven boundary points: 218460, 2202141; 218559, 2201989; 218475, 2201865; 218371, 2201844; 218139, 2202042; 218291, 2202179; 218460, 2202141.

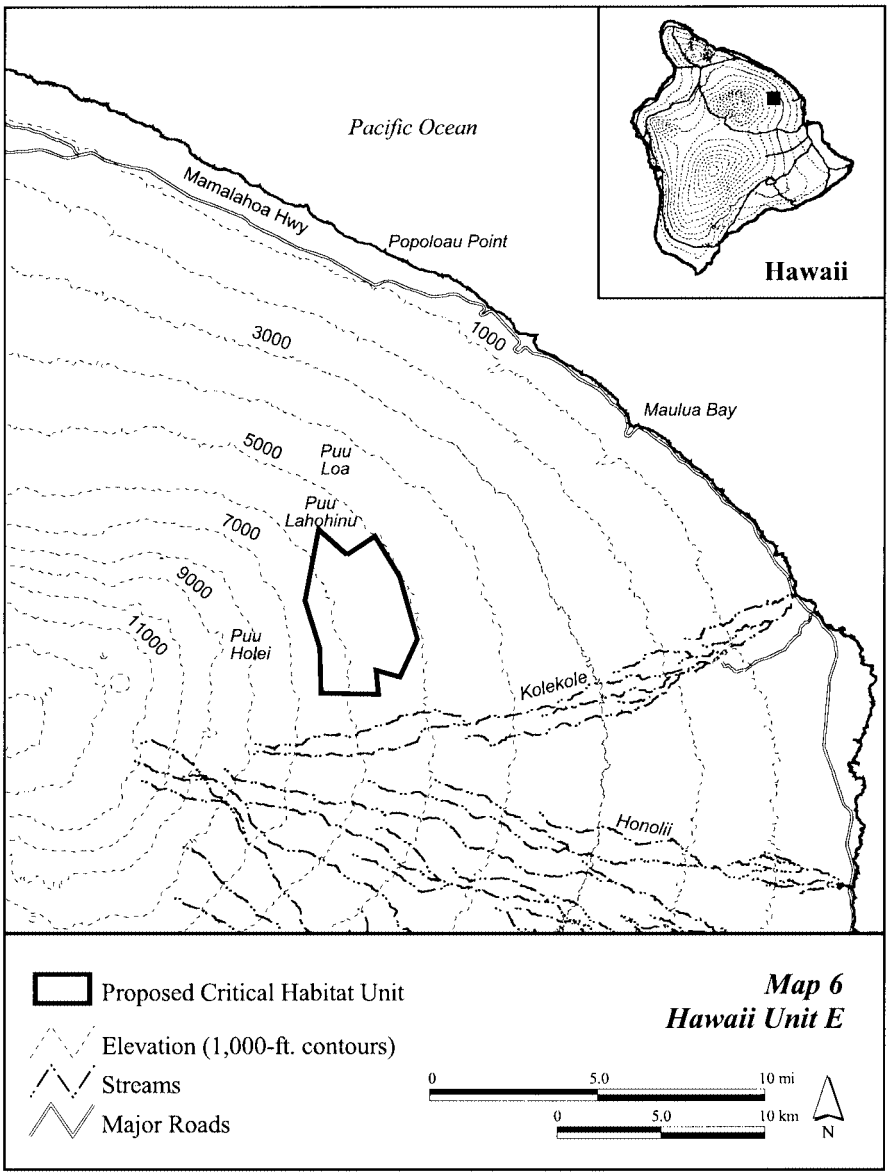
(*ii*) **Note:** Map 5 follows:



(*13*) Hawaii E (2,992 ha; 7,393 ac)

(*i*) Unit consists of the following 12 boundary points: 256602, 2201844; 257942, 2202750; 259136, 2200808; 259973, 2197792; 259164, 2195977; 257990, 2196313; 258115, 2195161; 255348, 2195206; 255294, 2197390; 254588, 2199653; 255244, 2203058; 256602, 2201844.

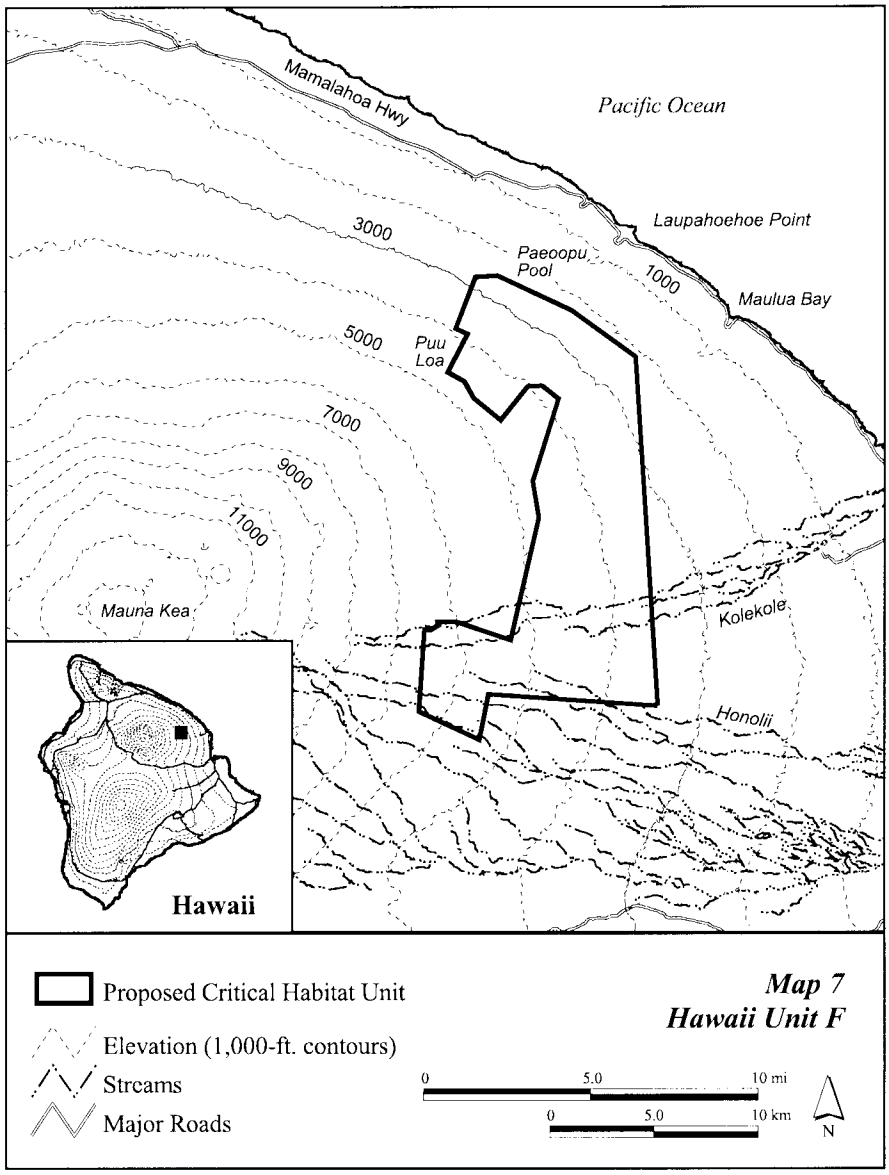
(*ii*) **Note:** Map 6 follows:



((*14*) Hawaii F (13,906 ha; 34,363 ac).

(*i*) Unit consists of the following 26 boundary points: 266711, 2189400; 258582, 2189967; 258122, 2187775; 255211, 2189128; 255480, 2193046; 255783, 2193024; 256116, 2193190; 256121, 2193417; 257062, 2193396; 259634, 2192559; 260989, 2198401; 260703, 2200148; 261944, 2204127; 261158, 2204766; 260467, 2204723; 259168, 2203086; 257856, 2204159; 257404, 2204963; 256622, 2205405; 257561, 2207252; 257006, 2207522; 257933, 2209976; 258996, 2210030; 262583, 2208378; 265651, 2206158; 266711, 2189400.

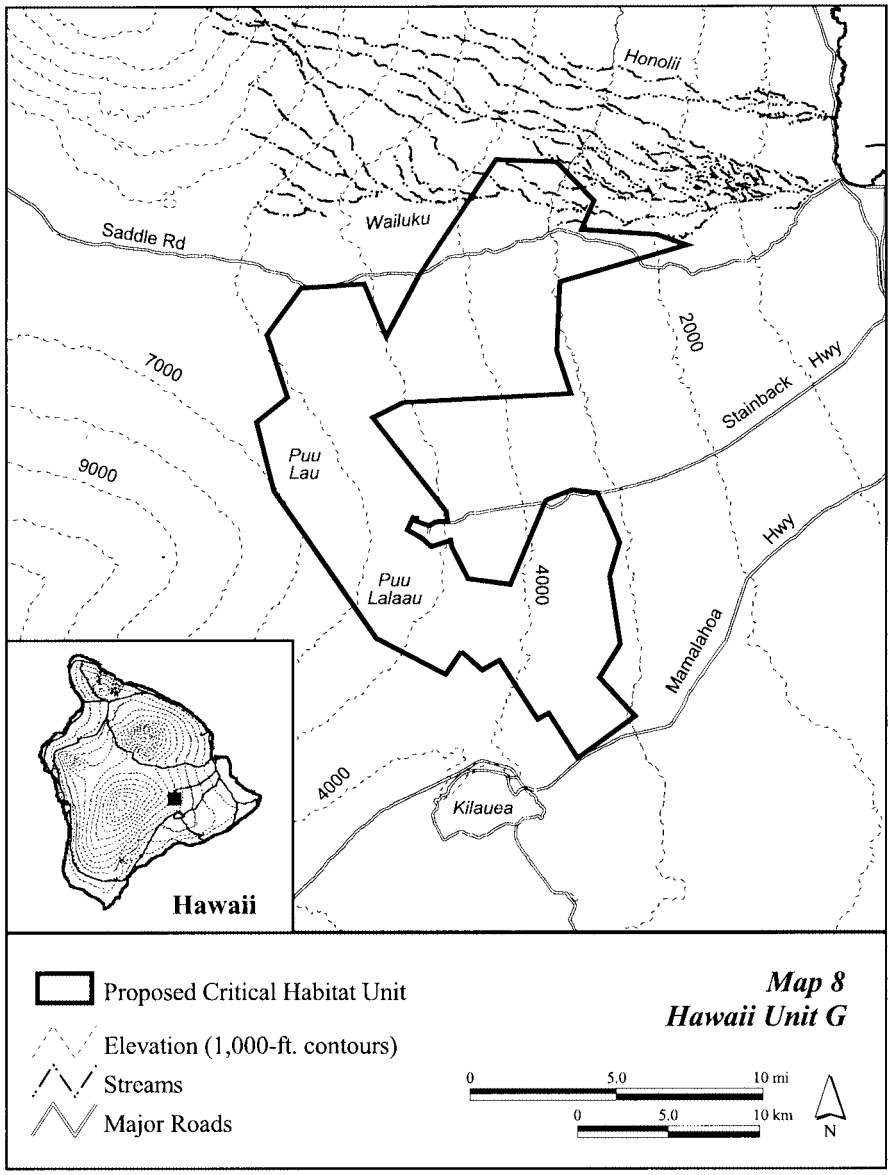
(*ii*) **Note:** Map 7 follows:



(*15*) Hawaii G (32,286 ha; 79,781 ac).

(*i*) Unit consists of the following 52 boundary points: 260368, 2156706; 259509, 2155445; 255714, 2157400; 250084, 2165481; 249140, 2169300; 250847, 2170639; 249738, 2174070; 251601, 2176619; 255032, 2176864; 256265, 2173968; 258036, 2177250; 262267, 2183657; 265594, 2183524; 267656, 2181395; 266981, 2179799; 271100, 2179533; 272746, 2178964; 265775, 2176949; 265615, 2173174; 266388, 2170855; 257222, 2170390; 255508, 2169531; 259558, 2164351; 259625, 2163807; 258983, 2163775; 258608, 2163559; 257889, 2163809; 257937, 2163979; 257725, 2164003; 257418, 2163342; 258185, 2162891; 258752, 2162422; 259789, 2162776; 259848, 2162373; 260734, 2160659; 263088, 2160361; 265004, 2164964; 266409, 2165548; 267862, 2165369; 268296, 2164387; 268316, 2164392; 269082, 2162635; 268527, 2160814; 269085, 2157102; 267952, 2155276; 269920, 2153164; 266755, 2150858; 265179, 2153340; 264559, 2152994; 262477, 2156217; 261502, 2155677; 260368, 2156706.

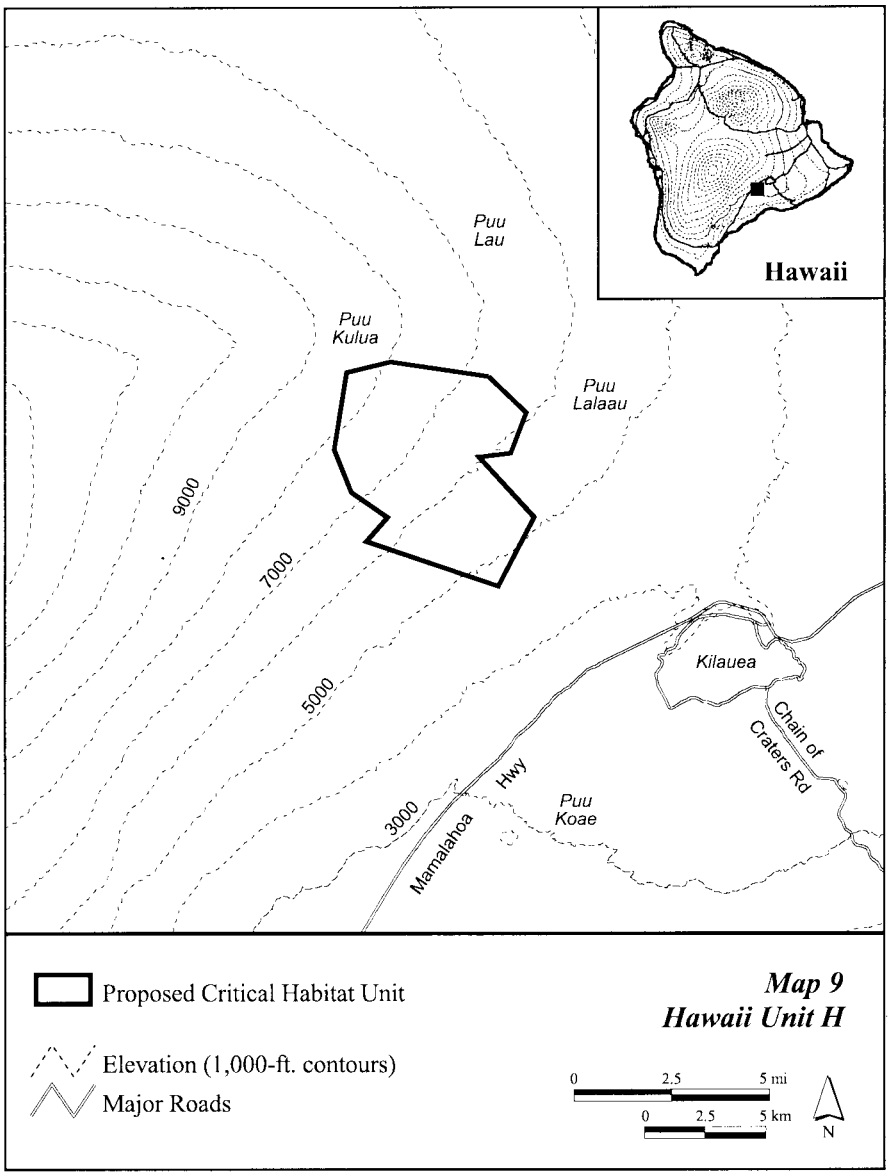
(*ii*) **Note:** Map 8 follows.



(*16*) Hawaii H (5,322 ha; 13,151 ac).

(*i*) Unit consists of the following 13 boundary points: 251923, 2160023; 253460, 2158526; 252820, 2156844; 251512, 2156703; 253803, 2154201; 252314, 2151377; 246870, 2153207; 247755, 2154211; 246280, 2155218; 245573, 2156986; 246070, 2160207; 247871, 2160627; 251923, 2160023.

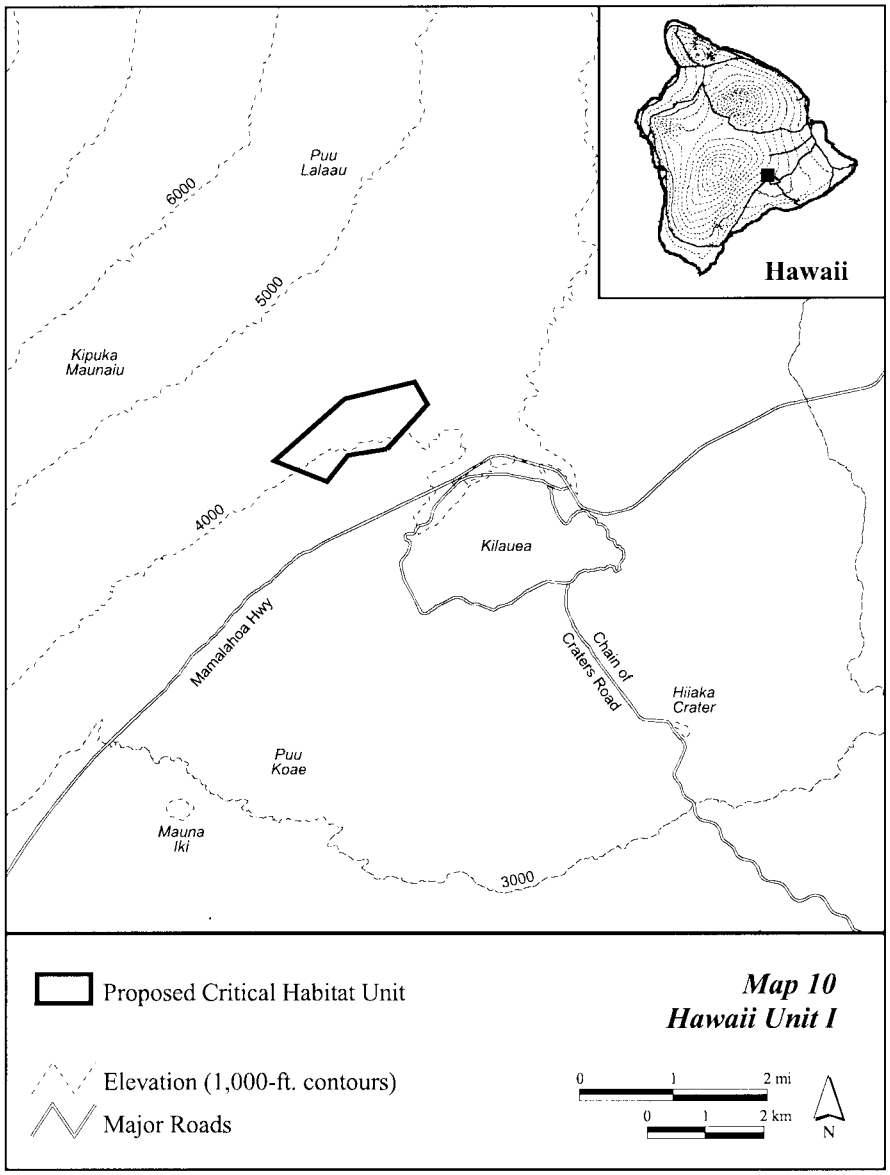
(*ii*) **Note:** Map 9 follows.



(*17*) Hawaii I (522 ha; 1,290 ac).

(*i*) Unit consists of the following eight boundary points: 258433, 2150898; 257351, 2150734; 256786, 2149999; 255343, 2150577; 257268, 2152271; 259182, 2152731; 259540, 2152124; 258433, 2150898.

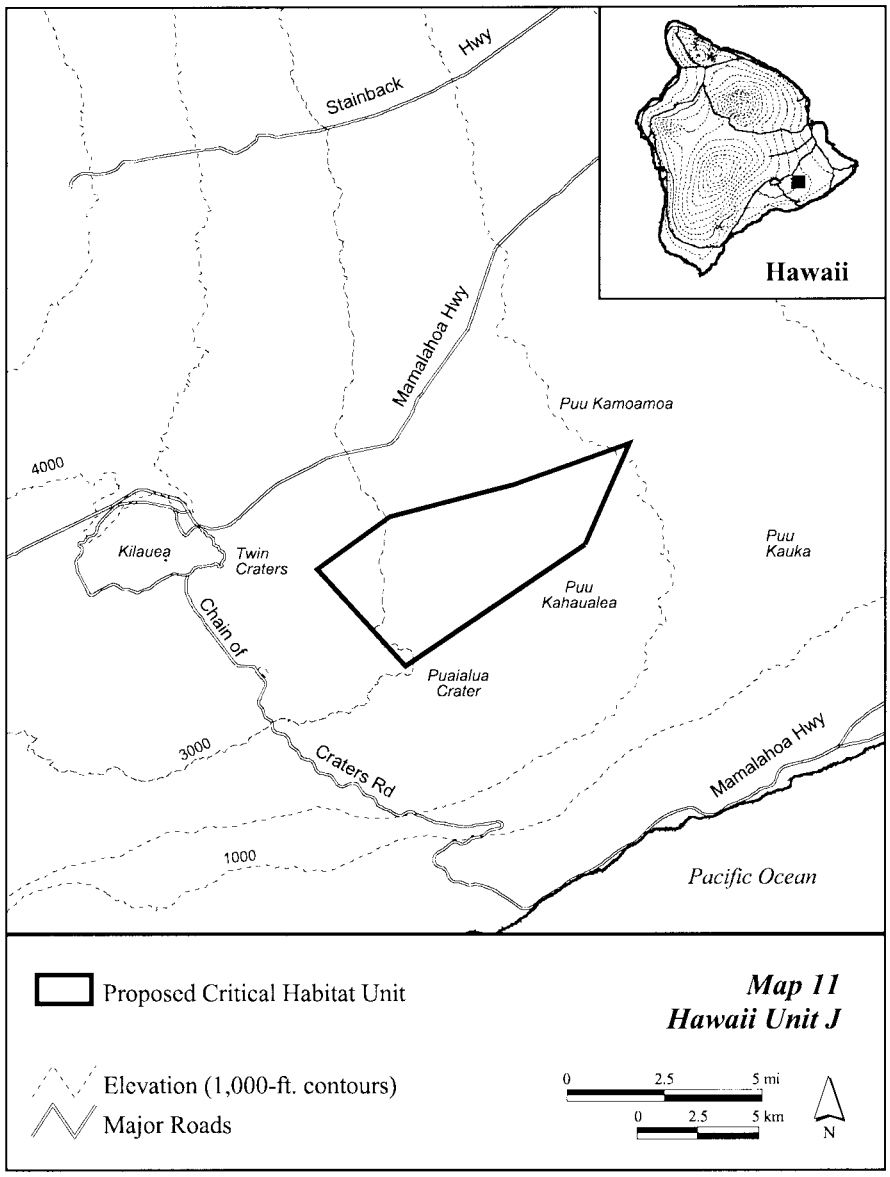
(*ii*) **Note:** Map 10 follows.



(*18*) Hawaii J (5,065 ha; 12,516 ac).

(*i*) Unit consists of the following seven boundary points: 279757, 2148468; 272371, 2143454; 268751, 2147441; 271710, 2149593; 276749, 2150890; 281591, 2152626; 279757, 2148468.

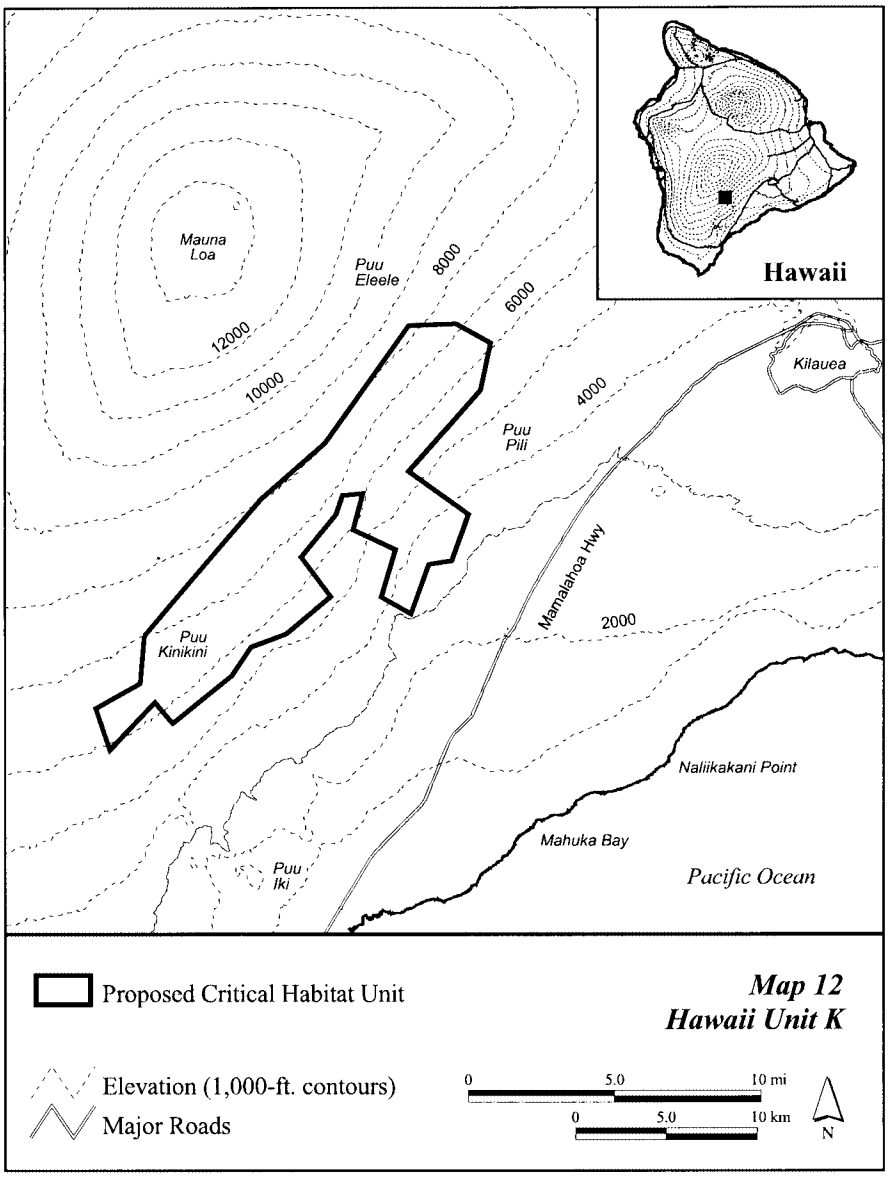
(*ii*) **Note:** Map 11 follows:



(*19*) Hawaii K (15,294 ha; 37,792 ac).

(*i*) Unit consists of the following 29 boundary points: 224527, 2133134; 230903, 2140619; 234438, 2143729; 238998, 2150111; 241626, 2150220; 243506, 2149158; 242986, 2146643; 238998, 2142139; 242286, 2139770; 241367, 2137225; 240125, 2137019; 239140, 2134291; 237510, 2135220; 238298, 2137823; 235958, 2138922; 236512, 2140899; 235380, 2140822; 235020, 2139742; 233111, 2137411; 234739, 2135265; 232310, 2133217; 230373, 2132524; 229332, 2130965; 226078, 2128345; 225106, 2129484; 222624, 2126875; 221850, 2129146; 224293, 2130509; 224527, 2133134.

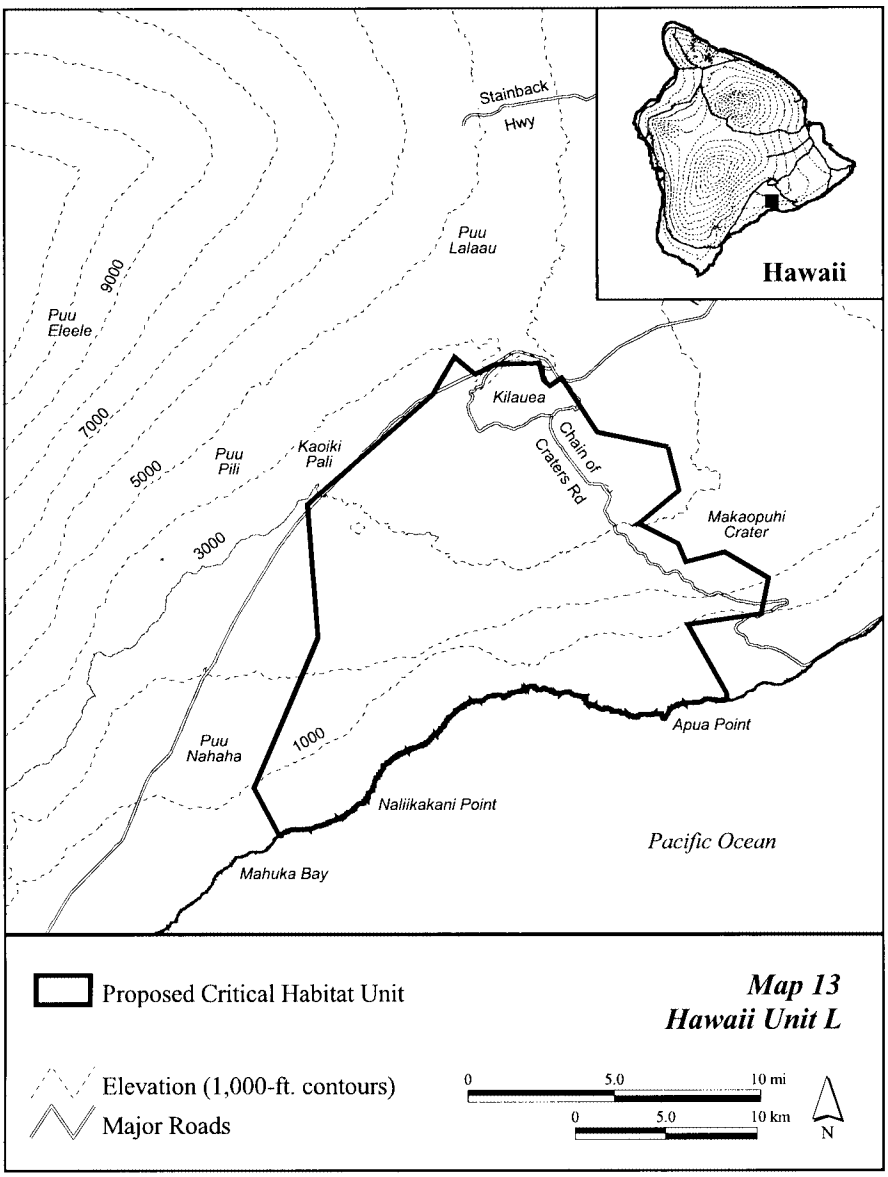
(*ii*) **Note:** Map 12 follows:



(*20*) Hawaii L (38,505 ha; 95,148 ac).

(*i*) Unit consists of the following 27 boundary points and the intermediate coastline: 269799, 2145483; 270429, 2143104; 268294, 2141333; 268202, 2141259; 268224, 2141247; 270343, 2140162; 270786, 2139161; 272920, 2139709; 275334, 2138290; 274935, 2136330; 270882, 2135751; 273045, 2131980; 273073, 2131644; 248432, 2124173; 247059, 2126847; 250585, 2135021; 249994, 2142352; 256883, 2148361; 258069, 2150441; 259217, 2149492; 260325, 2150029; 262724, 2150106; 262978, 2149151; 263296, 2148846; 263963, 2149299; 265911, 2146297; 269799, 2145483.

(*ii*) **Note:** Map 13 follows:



(*21*) Hawaii M1 (19 ha, 46 ac).

(*i*) Unit consists of the following six boundary points and the intermediate coastline: 290436, 2182514; 290346, 2182746; 290037, 2183187; 290191, 2183379; 290648, 2182628; 290436, 2182514.

(*ii*) **Note:** See Map 14:

(*22*) Hawaii M2 (133 ha, 328 ac).

(*i*) Unit consists of the following seven boundary points and the intermediate coastline: 299860, 2164658; 298430, 2165311; 298418, 2165662; 298918, 2165882; 299164, 2166128; 300166, 2164994; 299860, 2164658.

(*ii*) **Note:** See Map 14:

(*23*) Hawaii M3 (141 ha, 349 ac).

(*i*) Unit consists of the following eight boundary points and the intermediate coastline: 302785, 2149537; 305121, 2151610; 305379, 2151558; 305688, 2151734; 305768, 2151825; 305926, 2151657; 302998, 2149399; 302785, 2149537.

(*ii*) **Note:** See Map 14:

(*24*) Hawaii M4 (141 ha, 348 ac).

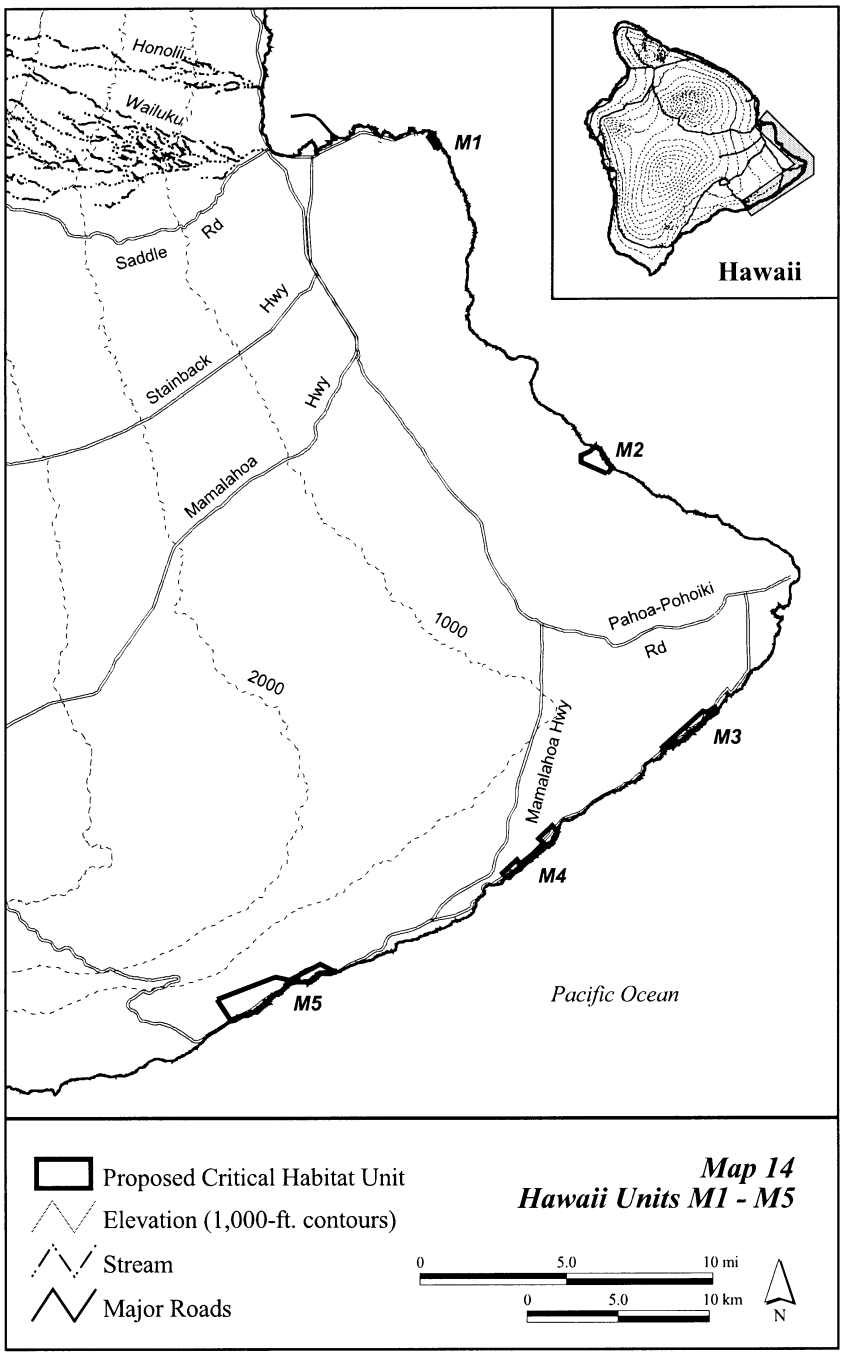
(*i*) Unit consists of the following 10 boundary points and the intermediate coastline: 294327, 2142439; 294091, 2142729; 294897, 2143498; 295092, 2143256; 295740, 2143796; 296348, 2144415; 296086, 2144633; 296853, 2145365; 297150, 2145025; 294327, 2142439.

(*ii*) **Note:** See Map 14:

(*25*) Hawaii M5 (533 ha, 1,316 ac).

(*i*) Unit consists of the following 10 boundary points and the intermediate coastline: 278462, 2135799; 281674, 2137029; 282395, 2136841; 284108, 2137718; 284803, 2137355; 284850, 2137360; 284874, 2137349; 284893, 2137276; 279221, 2134615; 278462, 2135799.

(*ii*) **Note:** Map 14 follows:



(*26*) Hawaii N1 (35 ha; 88 ac).

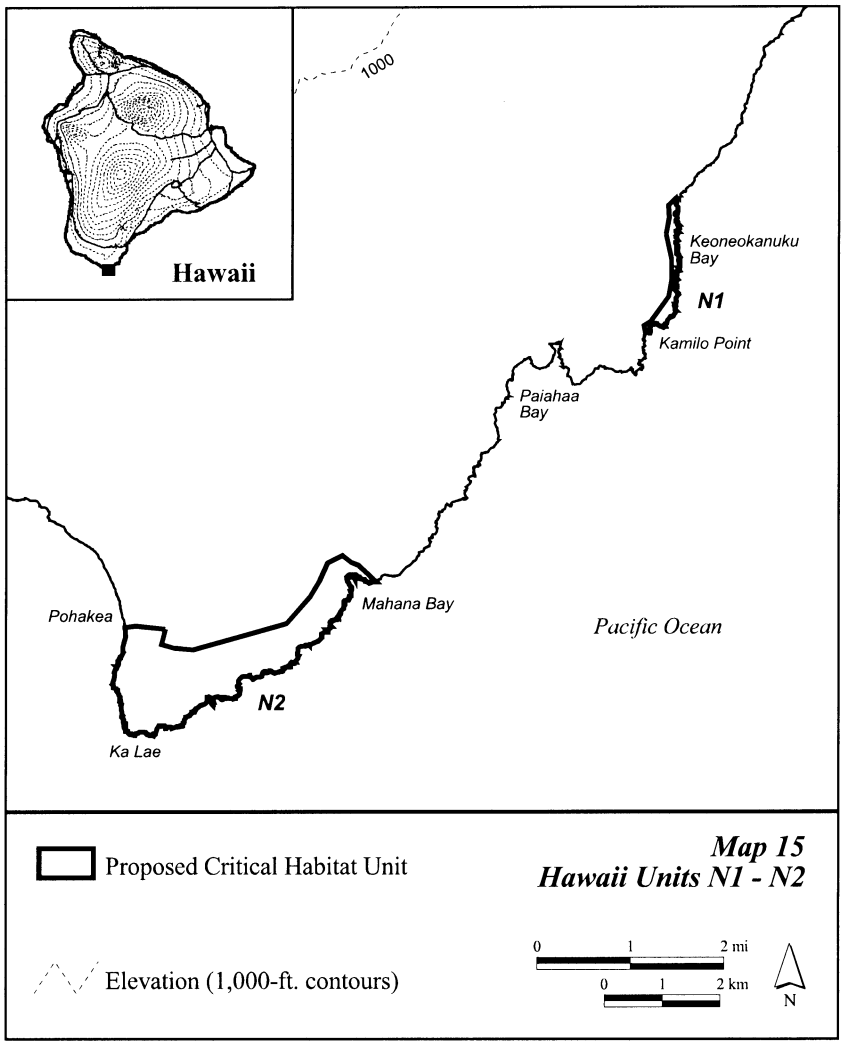
(*i*) Unit consists of the following 12 boundary points and the intermediate coastline: 226741, 2101686; 226790, 2101953; 226781, 2102176; 226908, 2102299; 226917, 2102261; 226379, 2099994; 226353, 2100102; 226476, 2100184; 226781, 2100602; 226831, 2100880; 226831, 2101257; 226741, 2101686.

(*ii*) **Note:** See Map 15:

(*27*) Hawaii N2 (441 ha; 1,091 ac).

(*i*) Unit consists of the following 17 boundary points and the intermediate coastline: 218146, 2094919; 218077, 2094656; 218291, 2094588; 218623, 2094561; 220226, 2095017; 220630, 2095479; 220789, 2095748; 220926, 2096057; 221185, 2096180; 221326, 2096062; 221462, 2096012; 221594, 2095880; 221763, 2095728; 217452, 2094960; 217481, 2094950; 217632, 2094974; 218146, 2094919.

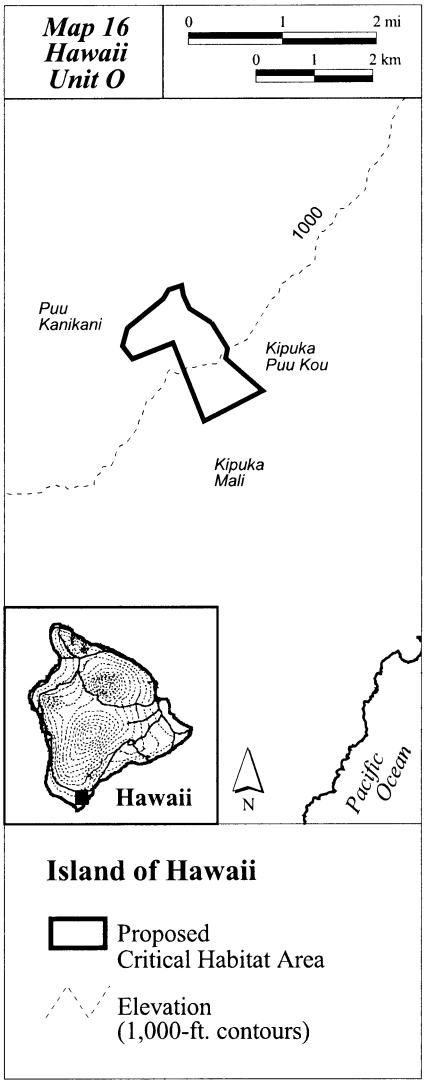
(*ii*) **Note:** Map 15 follows:


Hawaii
1000
Keoneokanuku Bay
N1
Kamilo Point
Paiahaa Bay
Mahana Bay
Pohakea
Pacific Ocean
N2
Ka Lae
Proposed Critical Habitat Unit
Map 15
Hawaii Units N1 - N2
Elevation (1,000-ft. contours)
0 1 2 mi
0 1 2 km
N

(*28*) Hawaii O (215 ha; 531 ac).

(*i*) Unit consists of the following 15 boundary points: 221200, 2105198; 221467, 2104758; 221444, 2104588; 222078, 2104024; 221064, 2103509; 220535, 2104849; 219841, 2104574; 219669, 2104802; 219758, 2105103; 220370, 2105598; 220464, 2105761; 220683, 2105838; 220715, 2105654; 220821, 2105428; 221200, 2105198.

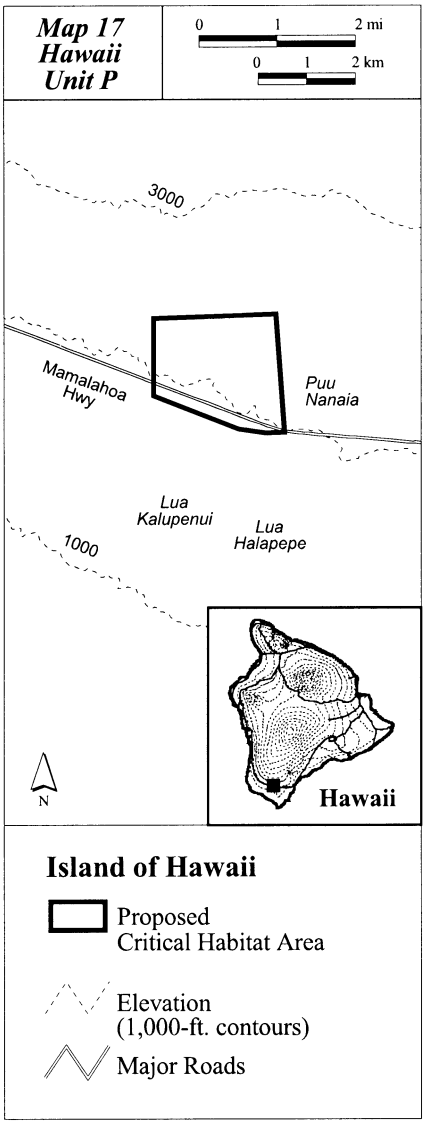
(*ii*) **Note:** Map 16 follows:



(*29*) Hawaii P (547 ha; 1,351 ac).

(*i*) Unit consists of the following seven boundary points: 215125, 2109609; 214584, 2109691; 212813, 2110371; 212813, 2111962; 215328, 2112049; 215501, 2109621; 215125, 2109609.

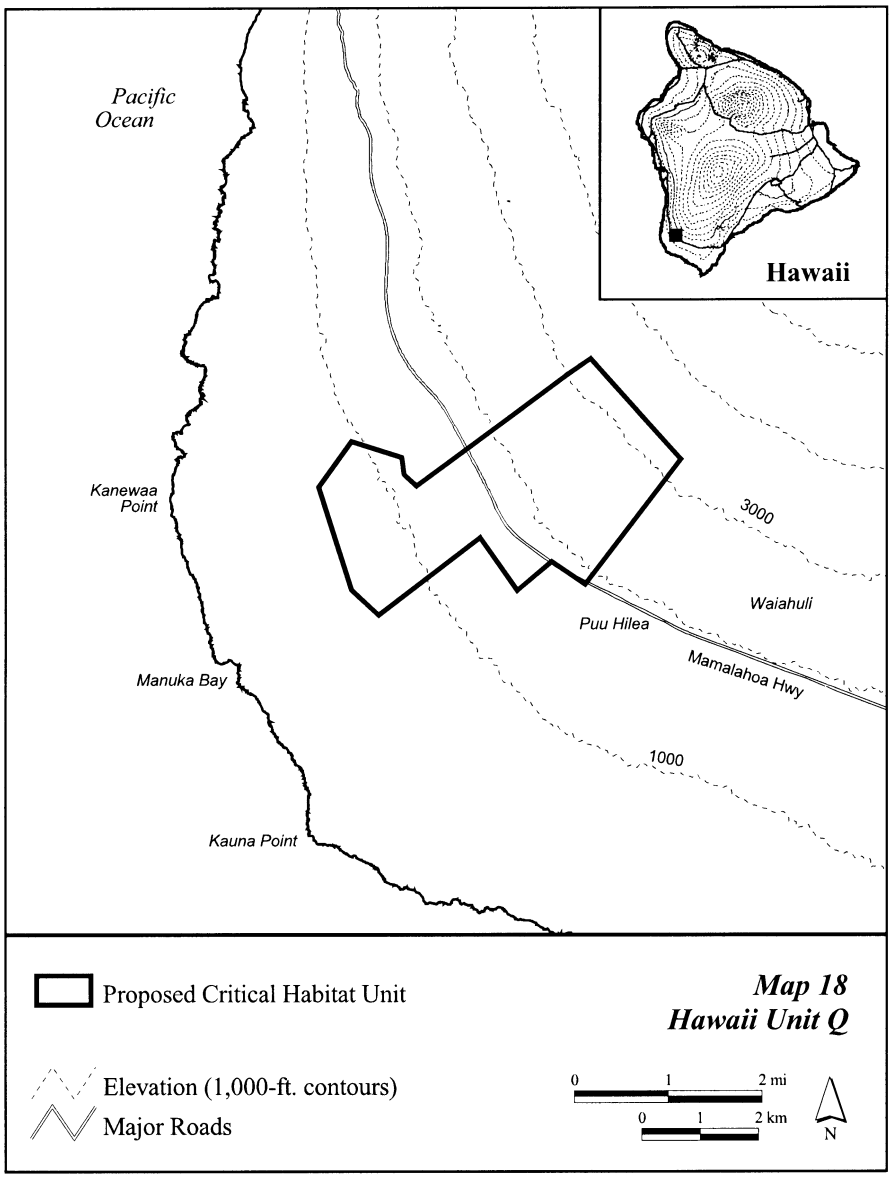
(*ii*) **Note:** Map 17 follows:



(*30*) Hawaii Q (3,549 ha; 8,770 ac).

(*i*) Unit consists of the following 15 boundary points: 203744, 2119863; 204434, 2120339; 206918, 2117598; 204288, 2114159; 203379, 2114793; 202419, 2113989; 201403, 2115445; 198635, 2113306; 197884, 2114011; 196992, 2116831; 197884, 2118084; 199261, 2117650; 199326, 2117178; 199670, 2116873; 203744, 2119863.

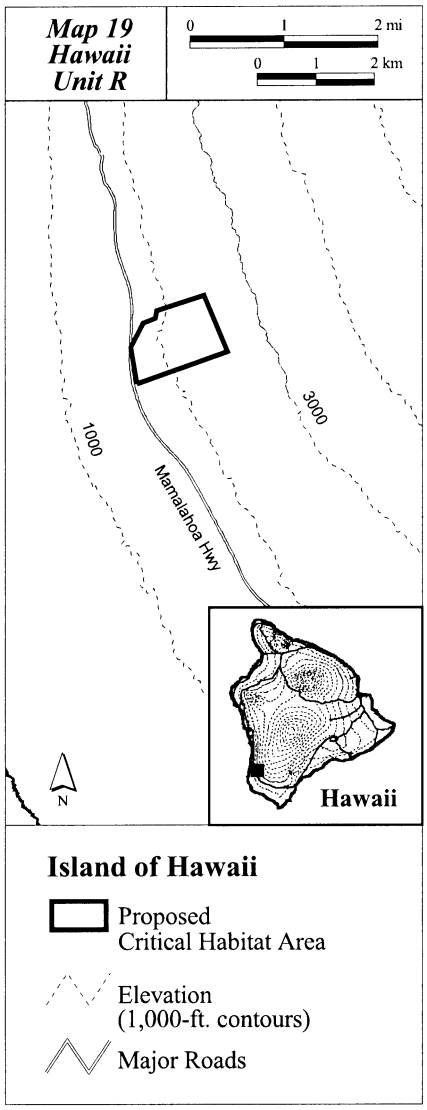
(*ii*) **Note:** Map 18 follows:


Pacific Ocean
Hawaii
Kanewaa Point
Manuka Bay
Kauna Point
3000
1000
Waiahuli
Puu Hilea
Mamalahoa Hwy
Proposed Critical Habitat Unit
Map 18
Hawaii Unit Q
Elevation (1,000-ft. contours)
Major Roads
0 1 2 mi
0 1 2 km
N

(*31*) Hawaii R (387 ha; 387 ac).

(*i*) Unit consists of the following eight boundary points: 199019, 2121433; 198840, 2122426; 199183, 2123093; 199523, 2123234; 199557, 2123431; 200864, 2123853; 201509, 2122322; 199019, 2121433.

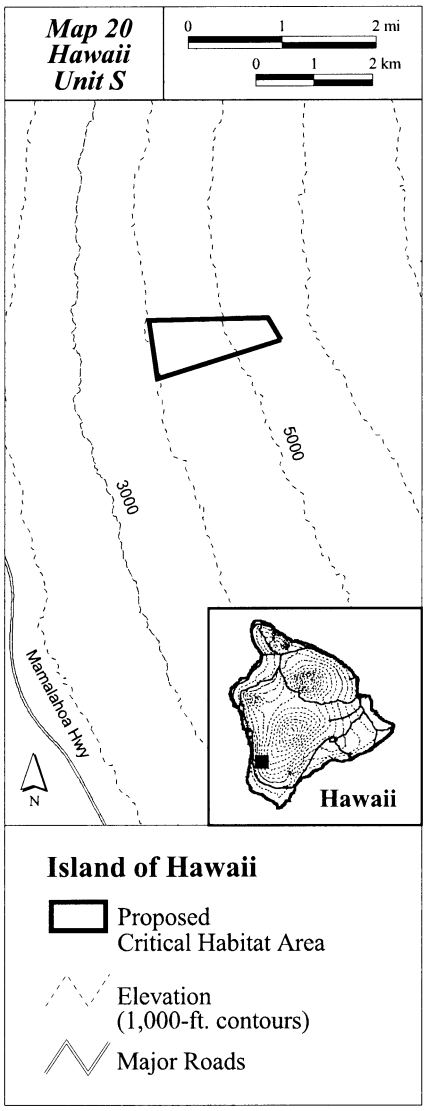
(*ii*) **Note:** Map 19 follows:



(*32*) Hawaii S (383 ha; 947 ac).

(*i*) Unit consists of the following five boundary points: 206224, 2130517; 202842, 2129444; 202613, 2131045; 205877, 2131123; 206224, 2130517.

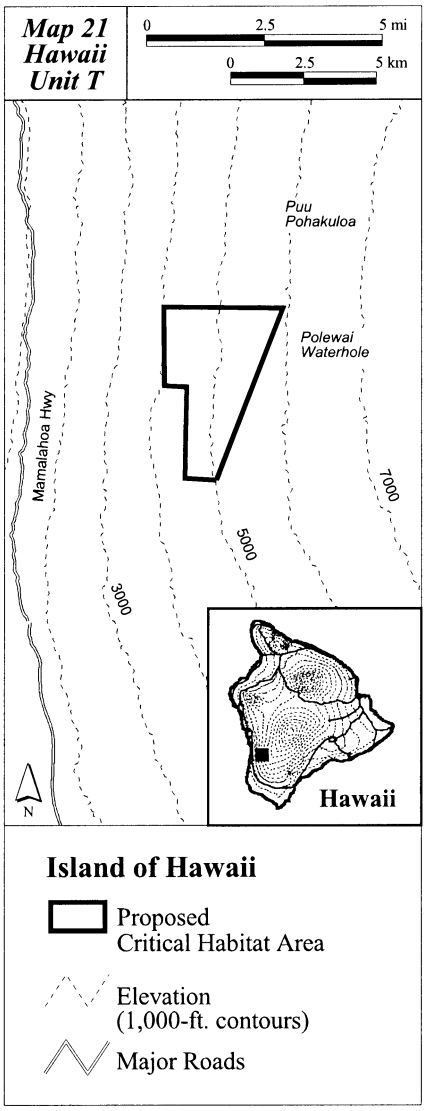
(*ii*) **Note:** Map 20 follows:



(*33*) Hawaii T (1,489 ha; 3,681 ac).

(*i*) Unit consists of the following seven boundary points: 204443, 2132607; 203375, 2132666; 203443, 2135792; 202673, 2135845; 202654, 2138543; 206732, 2138501; 204443, 2132607.

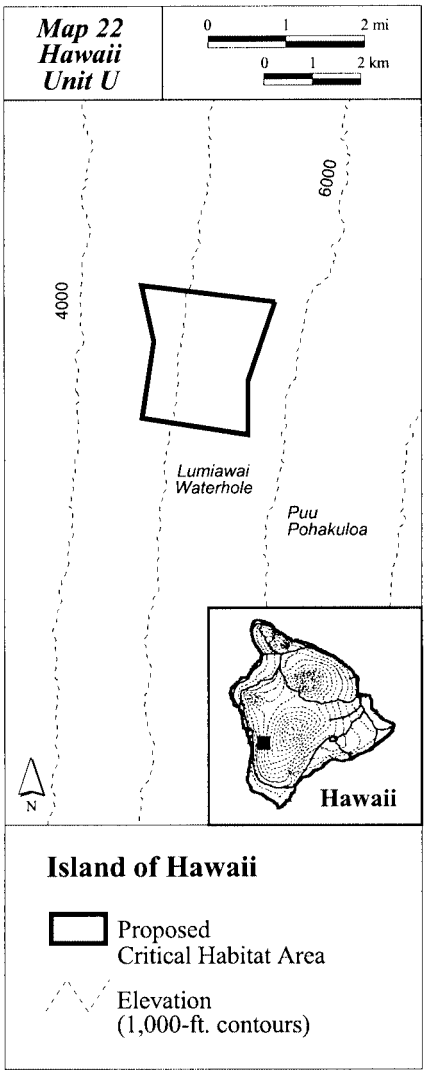
(*ii*) **Note:** Map 21 follows:



(*34*) Hawaii U (615 ha; 1,520 ac).

(*i*) Unit consists of the following seven boundary points: 207156, 2146304; 206598, 2144681; 206598, 2143570; 204428, 2143915; 204674, 2145490; 204421, 2146650; 207156, 2146304.

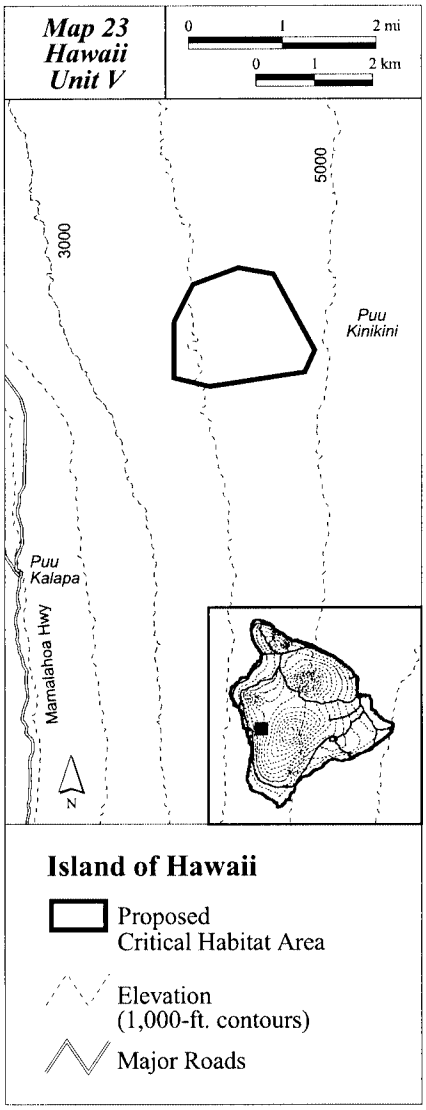
(*ii*) **Note:** Map 22 follows:



(*35*) Hawaii V (951 ha; 951 ac).

(*i*) Unit consists of the following nine boundary points: 201716, 2156441; 202236, 2157481; 203493, 2157946; 204443, 2157768; 205570, 2155691; 205302, 2155071; 202715, 2154681; 201716, 2154917; 201716, 2156441.

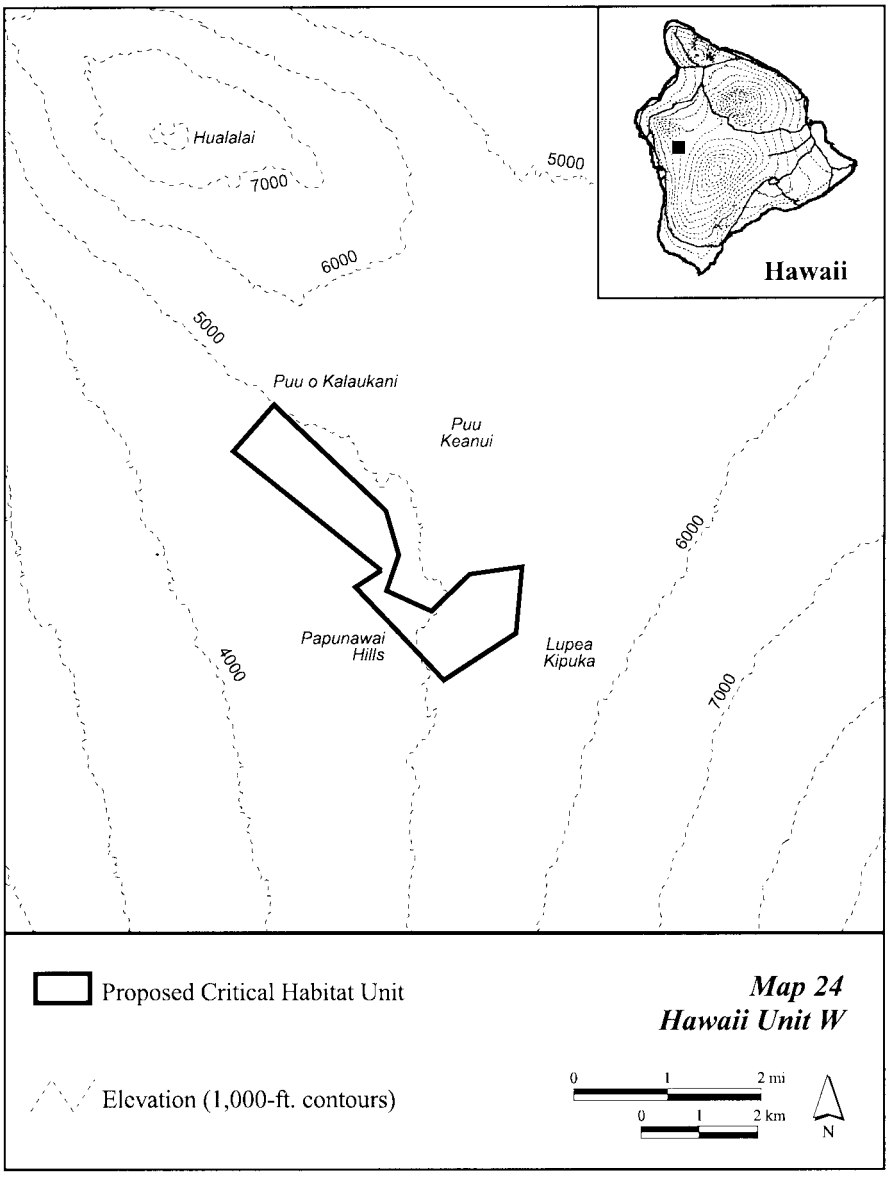
(*ii*) **Note:** Map 23 follows:



(*36*) Hawaii W (1,479 ha; 3,654 ac).

(*i*) Unit consists of the following 13 boundary points: 205252, 2167635; 201198, 2170923; 202321, 2172189; 205378, 2169282; 205734, 2168071; 205395, 2167074; 206630, 2166529; 207676, 2167534; 209126, 2167741; 208948, 2165908; 206971, 2164632; 204555, 2167184; 205252, 2167635.

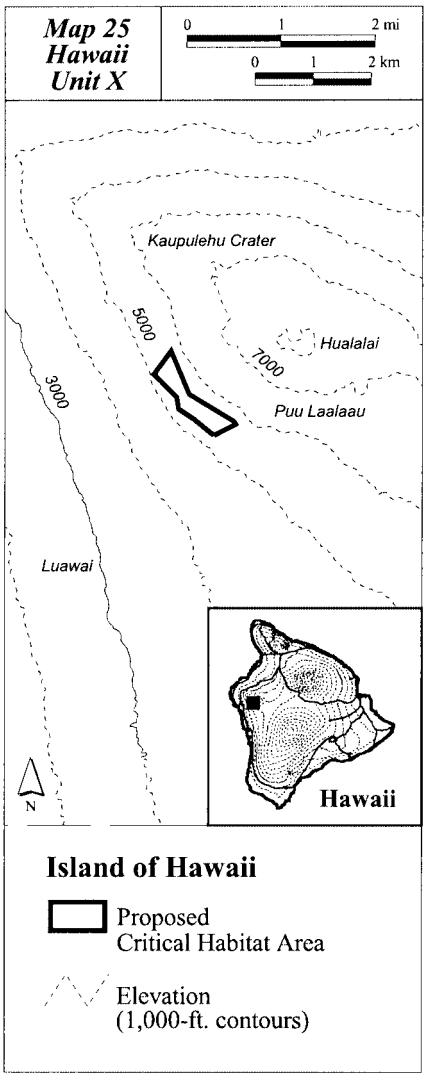
(*ii*) **Note:** Map 24 follows:


Hualalai
7000
6000
5000
5000
Puu o Kalaukani
Puu
Keanui
6000
Papunawai
Hills
Lupea
Kipuka
4000
7000
Hawaii
Proposed Critical Habitat Unit
Map 24
Hawaii Unit W
Elevation (1,000-ft. contours)
0
1
2 mi
0
1
2 km
N

(*37*) Hawaii X (138 ha; 340 ac).

(*i*) Unit consists of the following nine boundary points: 197194, 2177013; 196714, 2177434; 196239, 2177751; 196187, 2178067; 195553, 2178701; 196028, 2179334; 196530, 2178147; 197744, 2177408; 197793, 2177330.

(*ii*) **Note:** Map 25 follows:



(*38*) Hawaii Y1 (212 ha; 524 ac).

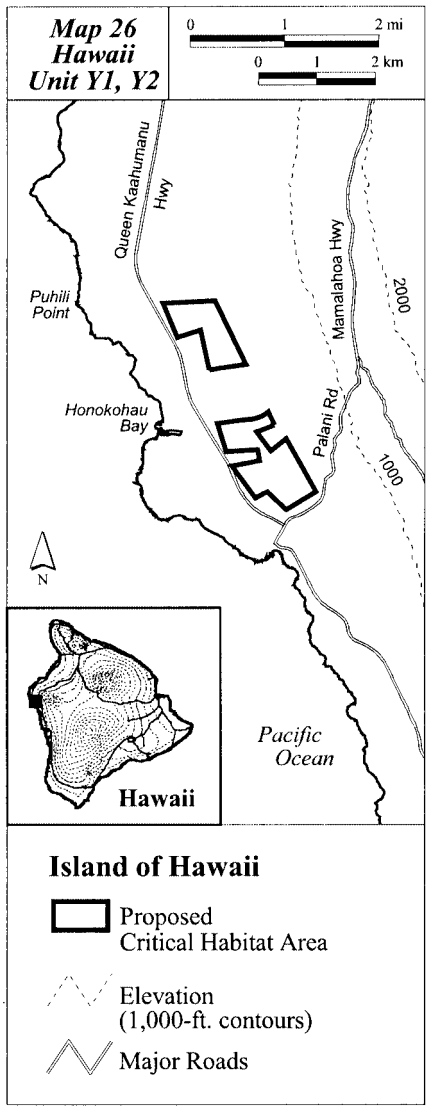
(*i*) Unit consists of the following seven boundary points: 183972, 2179379; 183738, 2180484; 183094, 2180286; 182697, 2181215; 184122, 2181277; 184966, 2179538; 184138, 2179420.

(*ii*) **Note:** Map 26 follows:

(*39*) Hawaii Y2 (334 ha; 826 ac).

(*i*) Unit consists of the following 18 boundary points: 185749, 2177865; 185261, 2177684; 185647, 2177155; 186075, 2177494; 186885, 2176018; 186069, 2175532; 185540, 2176019; 185232, 2175842; 184584, 2176731; 185340, 2176888; 185300, 2177182; 184431, 2177142; 184190, 2177908; 184571, 2177971; 184963, 2178008; 185173, 2178026; 185406, 2178122; 185576, 2178230.

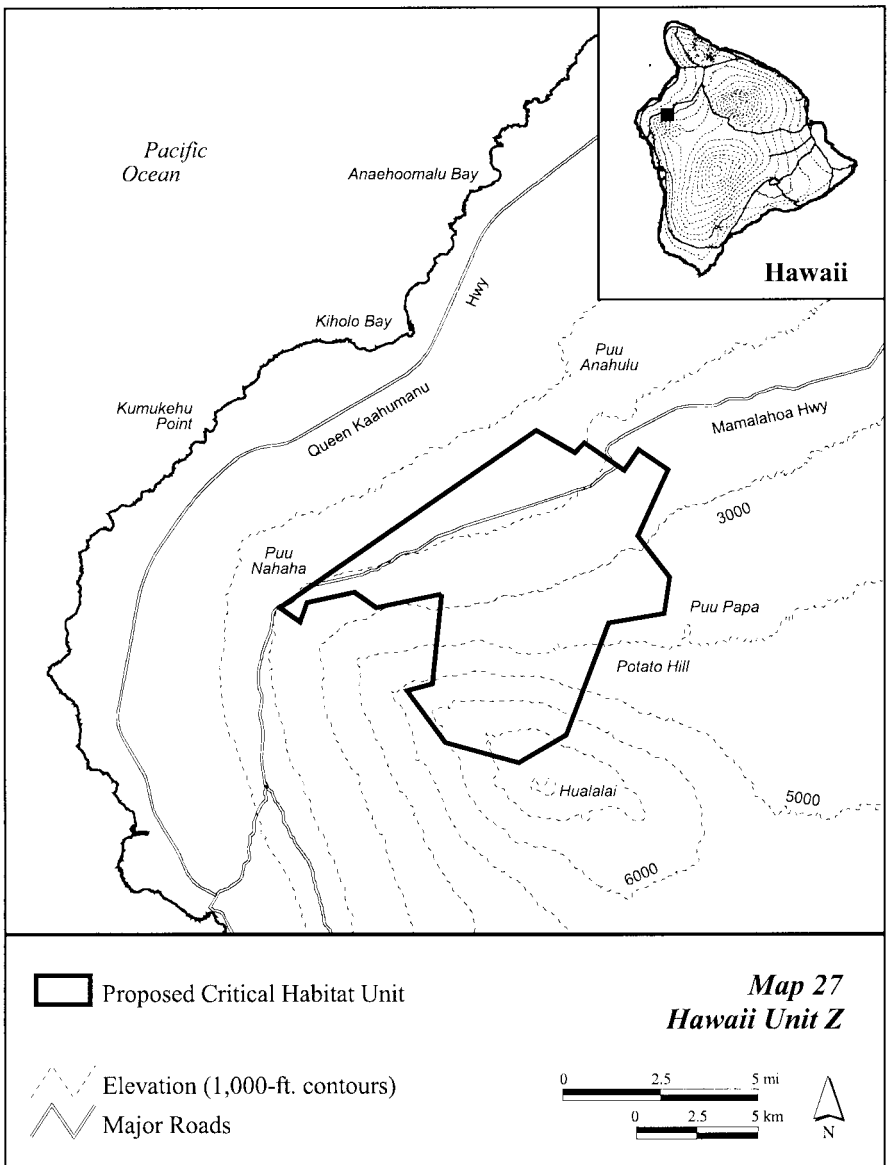
(*ii*) **Note:** Map 26 follows:



(*40*) Hawaii Z (10,738 ha; 26,535 ac).

(*i*) Unit consists of the following 22 boundary points: 195290, 2187514; 192592, 2186941; 191694, 2187574; 189745, 2187154; 189472, 2186376; 188637, 2186944; 199157, 2194227; 200761, 2193290; 201154, 2193708; 202794, 2192559; 203397, 2193436; 204610, 2192598; 203353, 2189881; 204671, 2188173; 204462, 2186704; 202154, 2186315; 200408, 2181683; 198449, 2180555; 195423, 2181386; 193852, 2183527; 194901, 2183797; 195290, 2187514.

(*ii*) **Note:** Map 27 follows:



(*41*) Hawaii AA (28,384 ha; 70,138 ac).

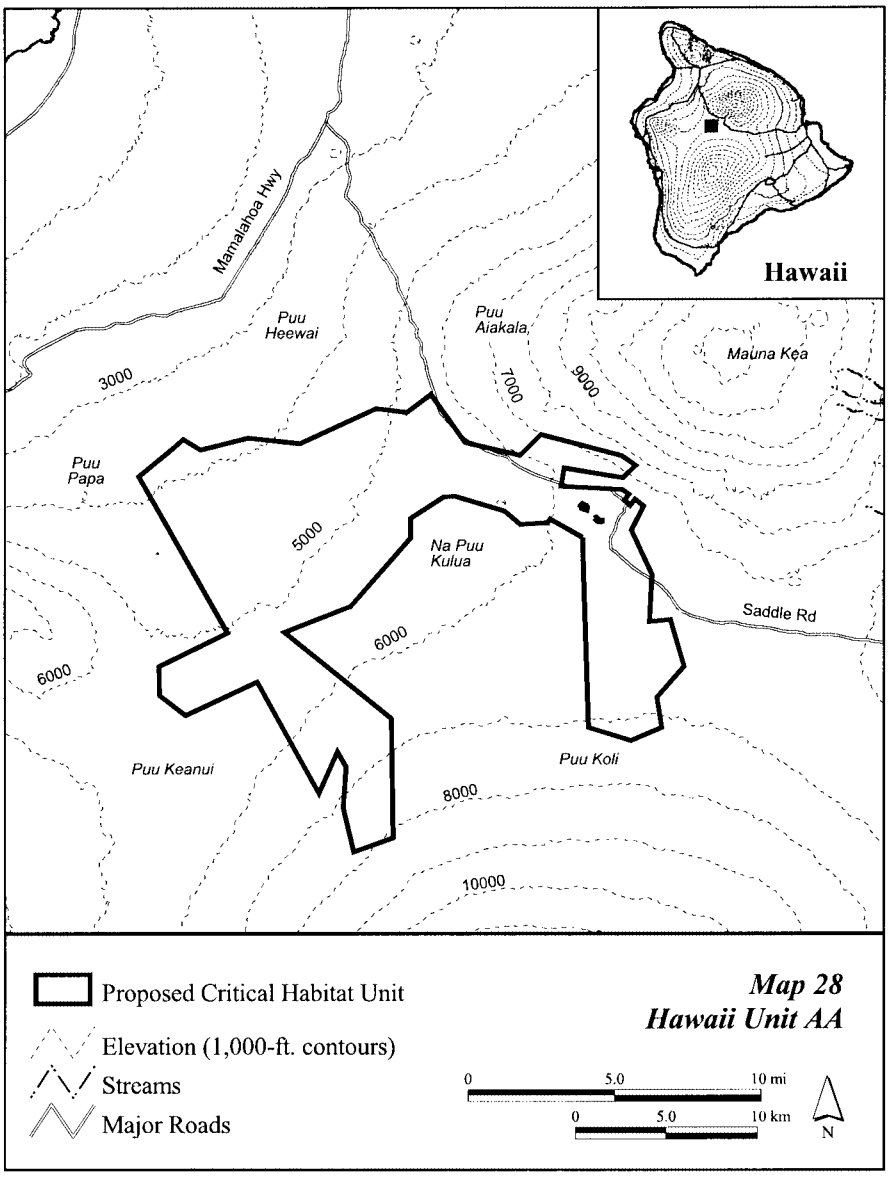
(*i*) Unit consists of the following 67 boundary points: 232723, 2183705; 230919, 2184740; 230815, 2184516; 229320, 2184420; 228423, 2185167; 225733, 2185964; 225124, 2185943; 223293, 2184769; 223290, 2183683; 220000, 2179930; 219994, 2179923; 219987, 2179918; 219981, 2179913; 219977, 2179911; 219973, 2179909; 219965, 2179906; 216370, 2178543; 222247, 2173811; 222322, 2167265; 222322, 2167257; 222335, 2167257; 220155, 2166489; 219579, 2168927; 219762, 2171154; 219286, 2172006; 218282, 2169685; 214867, 2175808; 210939, 2174004; 209532, 2175089; 209494, 2176651; 213262, 2178498; 208392, 2187047; 210165, 2188544; 210162, 2188542; 210803, 2189143; 211768, 2188558; 214377, 2189201; 217216, 2188903; 221396, 2190818; 222990, 2190609; 223038, 2190602; 223044, 2190601; 224382, 2191593; 226252, 2188954; 229287, 2188260; 230414, 2189388; 234885, 2188211; 235657, 2187676; 234948, 2187010; 231708, 2187545; 231561, 2186512; 234898, 2186362; 235254, 2186077; 235032, 2185729; 235339, 2185480; 235602, 2185805; 236072, 2185421; 235419, 2184116; 236547, 2181683; 236410, 2179093; 237588, 2179190; 238332, 2176662; 236820, 2174962; 237090, 2173313; 235396, 2172615; 233055, 2173313; 232723, 2183705.

(*ii*) Excluding the following two areas:

(*A*) Bounded by the following 7 boundary points (10ha, 24ac): 232577, 2185323; 232599, 2185467; 232714, 2185578; 232934, 2185467; 232998, 2185368; 232954, 2185202; 232577, 2185323.

(*B*) Bounded by the following 9 boundary points (5ha, 11ac): 233384, 2184752; 233480, 2184822; 233636, 2184644; 233786, 2184671; 233811, 2184653; 233813, 2184596; 233682, 2184541; 233484, 2184638; 233384, 2184752.

(*iii*) **Note:** Map 28 follows:


Hawaii
Mamalahoa Hwy
Puu Heewai
Puu Aiakala
Mauna Kea
3000
7000
9000
Puu Papa
5000
Na Puu Kulua
Saddle Rd
6000
6000
Puu Keanui
Puu Koli
8000
10000
Proposed Critical Habitat Unit
Elevation (1,000-ft. contours)
Streams
Major Roads
Map 28
Hawaii Unit AA
0
5.0
10 mi
0
5.0
10 km
N

(*42*) Hawaii BB (43 ha; 106 ac).

(*i*) Unit consists of the following 13 boundary points and the intermediate coastline: 181769, 2190198; 181706, 2189862; 181589, 2189862; 181195, 2189687; 180990, 2189424; 180757, 2189337; 180698, 2189351; 180707, 2189442; 181635, 2190130; 181662, 2190111; 181735, 2190198; 181750, 2190198; 181769, 2190198.

(*ii*) **Note:** Map 29 follows:

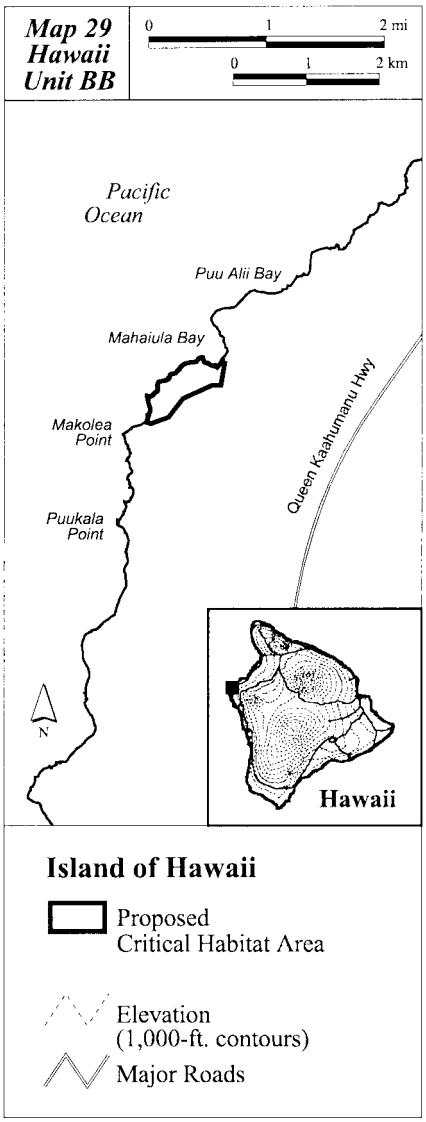


TABLE (a)(1)(i)(H).—PROTECTED SPECIES WITHIN EACH CRITICAL HABITAT UNIT ON THE ISLAND OF HAWAII

Unit name	Species occupied	Species unoccupied
Hawaii A1	*Pleomele hawaiiensis*	
Hawaii A2	*Nothocestrum breviflorum*	
Hawaii B	*Achyranthes mutica*, *Clermontia drepanomorpha*, *Phyllostegia warshaueri*.	
Hawaii C	*Sesbania tomentosa*	
Hawaii D1	*Portulaca sclerocarpa*	*Isodendrion hosakae*, *Vigna o-wahuensis*.
Hawaii D2		*Isodendrion hosakae*, *Portulaca sclerocarpa*, *Vigna o-wahuensis*.
Hawaii D3		*Isodendrion hosakae.*
Hawaii D4		*Isodendrion hosakae*, *Portulaca sclerocarpa*, *Vigna o-wahuensis*.
Hawaii D5	*Isodendrion hosakae*, *Portulaca sclerocarpa*, *Vigna o-wahuensis*.	
Hawaii D6		*Isodendrion hosakae*, *Portulaca sclerocarpa*, *Vigna o-wahuensis*.
Hawaii D7	*Isodendrion hosakae*, *Portulaca sclerocarpa*	*Vigna o-wahuensis*.
Hawaii D8	*Isodendrion hosakae*	*Portulaca sclerocarpa*, *Vigna o-wahuensis*.
Hawaii E	*Clermontia lindseyana*, *Clermontia pyrularia*, *Phyllostegia racemosa*.	
Hawaii F	*Cyanea platyphylla*, *Cyanea shipmanii*, *Cyrtandra giffardii*, *Cyrtandra tintinnabula*, *Phyllostegia racemosa*, *Phyllostegia warshaueri*.	*Clermontia peleana*.

TABLE (a)(1)(i)(H).—PROTECTED SPECIES WITHIN EACH CRITICAL HABITAT UNIT ON THE ISLAND OF HAWAII—Continued

Unit name	Species occupied	Species unoccupied
Hawaii G	*Argyroxiphium kauense*, *Asplenium fragile* var. *insulare*, *Clermontia lindseyana*, *Cyanea platyphylla*, *Cyanea shipmanii*, *Cyanea stictophylla*, *Cyrtandra giffardii*, *Phyllostegia racemosa*, *Phyllostegia velutina*, *Plantago hawaiense*, *Sicyos alba*.	*Clermontia peleana*.
Hawaii H	*Argyroxiphium kauense*, *Phyllostegia racemosa*, *Plantago hawaiensis*, *Silene hawaiiensis*.	
Hawaii I	*Hibiscadelphus giffardianus*, *Melicope zahlbruckneri*	
Hawaii J	*Adenophorus periens*	
Hawaii K	*Argyroxiphium kauense*, *Asplenium fragile* var. *insulare*, *Clermontia lindseyana*, *Cyanea stictophylla*, *Phyllostegia velutina*.	*Melicope zahlbruckneri*
Hawaii L	*Pleomele hawaiiensis*, *Portulaca sclerocarpa*, *Sesbania tomentosa*.	
Hawaii M1	*Ischaemum byrone*	
Hawaii M2	*Ischaemum byrone*	
Hawaii M3	*Ischaemum byrone*	
Hawaii M4	*Ischaemum byrone*	
Hawaii M5	*Ischaemum byrone*	
Hawaii N1	*Sesbania tomentosa*	
Hawaii N2	*Sesbania tomentosa*	
Hawaii O	*Mariscus fauriei*	
Hawaii P	*Pleomele hawaiiensis*	
Hawaii Q	*Colubrina oppositifolia*, *Diellia erecta*, *Flueggea neowawraea*, *Gouania vitifolia*, *Neraudia ovata*.	
Hawaii R	*Diellia erecta*, *Flueggea neowawraea*	
Hawaii S	*Cyanea hamatiflora* ssp. *carlsonii*, *Cyanea stictophylla*	
Hawaii T	*Cyanea stictophylla*	*Cyanea hamatiflora* ssp. *carlsonii*.
Hawaii U	*Cyanea hamatiflora* ssp. *carlsonii*	
Hawaii V	*Nothocestrum breviflorum*	
Hawaii W	Delissea undulata	*Solanum incompletum*.
Hawaii X	*Cyanea hamatiflora* ssp. *carlsonii*	
Hawaii Y1	*Neraudia ovata*	
Hawaii Y2	*Isodendrion pyrifolium*	*Neraudia ovata*.
Hawaii Z	*Bonamia menziesii*, *Colubrina oppositifolia*, *Cyanea stictophylla*, *Delissea undulata*, *Flueggea neowawraea*, *Hibiscadelphus hualalaiensis*, *Hibiscus brackenridgei*, *Nothocestrum breviflorum*, *Phyllostegia velutina*, *Plantago hawaiensis*, *Pleomele hawaiiensis*, *Zanthoxylum dipetalum* var. *tomentosum*.	
Hawaii AA	*Asplenium fragile* var *insulare*, *Hedyotis coriacea*, *Neraudia ovata*, *Portulaca sclerocarpa*, *Silene hawaiiensis*, *Silene lanceolata*, *Solanum incompletum*, *Spermolepis hawaiiensis*, *Tetramolopium arenarium*, *Zanthoxylum hawaiiense*.	
Hawaii BB	*Sesbania tomentosa*	

(ii) *Hawaiian plants—Constituent elements.*

(A) *Flowering plants.*

Family Amaranthaceae: Achyranthes mutica (NCN).

Hawaii B, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Achyranthes mutica* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Acacia koaia* lowland dry forest primarily in gulches but also in remnant stands of forest containing one or more of the following associated native plant species: *Dodonaea viscosa, Myoporum sandwicense, Osteomeles anthyllidifolia, Nestegis sandwicensis, Metrosideros polymorpha, Santalum ellipticum, Erythrina sandwicensis,* or *Sophora chrysophylla;* and

(*2*) Elevations between 643 and 1,518 m (2,110 and 4,990 ft).

Family Apiaceae: Spermolepis hawaiiensis (NCN).

Hawaii AA, identified in the legal description in paragraph (a)(1)(i)(H), constitute critical habitat for *Spermolepis hawaiiensis* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Shady spots in *Dodonaea viscosa* lowland dry shrubland, on pahoehoe lava and containing one or more of the following associated native plant species: *Myoporum sandwicense, Osteomeles anthyllidifolia,* or *Sophora chrysophylla,* and

(*2*) Elevations between 1,134 and 2,140 m (3,720 and 7,020 ft).

Family Asteraceae: Argyroxiphium kauense (Mauna Loa silversword).

Hawaii G, H, K, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Argyroxiphium kauense* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Moist open forest; subalpine mesic shrubland, bogs; and weathered, old pahoehoe (smooth) or aa (rough) lava with well developed pockets of soil, and containing one or more of the following associated native plant species: *Coprosma montana, Plantago hawaiensis, Silene hawaiiensis, Asplenium fragile* var. *insulare,*

Metrosideros polymorpha, Styphelia tameiameiae , Coprosma ernodeoides, Vaccinium reticulatum, Dubautia ciliolata, Geranium cuneatum, Carex montis-eeka, Carex alligata, Rhynchospora chinensis, Dodonaea viscosa, Gahnia gahniiformis, or *Deschampsia nubigena;* and

(*2*) Elevations between 1,625 and 2,774 m (3,330 and 9,100 ft).

Family Asteraceae: Tetramolopium arenarium (NCN).

Hawaii AA, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Tetramolopium arenarium* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Lowland and montane dry shrublands dominated by *Dodonaea viscosa,* containing one or more of the following associated native plant species: *Styphelia tameiameiae, Dubautia linearis, Chamaesyce olowaluana, Haplostachys haplostachya, Sida fallax,* or *Chenopodium oahuense,* and

(*2*) Elevations between 1,363 and 1,762 m (4,470 and 5,780 ft).

Family Campanulaceae: Clermontia drepanomorpha (oha wai).

Hawaii B, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Clermontia drepanomorpha* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha, Cheirodendron trigynum,* and *Cibotium glaucum* dominated montane wet forests, containing one or more of the following native plant species: *Carex alligata, Melicope clusiifolia, Styphelia tameiameiae, Astelia menziesii, Rubus hawaiiensis, Cyanea pilosa,* and *Coprosma* sp. or native sphagnum moss; and

(*2*) Elevations between 808 and 1,676 m (2,650 and 5,500 ft).

Family Campanulaceae: Clermontia lindseyana (haha).

Hawaii E, G, K, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Clermontia lindseyana* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Slightly open forest cover in wet and mesic *Metrosideros polymorpha-Acacia koa* forest, *Metrosideros polymorpha* forest, and mixed montane mesic *Metrosideros polymorpha-Acacia koa* forest and containing one or more of the following associated native plant species: *Styphelia tameiameiae, Cheirodendron trigynum, Rubus hawaiiensis, Coprosma* sp., *Athyrium* sp., or *Peperomia* sp., and

(*2*) Elevations between 1,314 and 2,256 m (4,310 and 7,400 ft).

Family Campanulaceae: Clermontia peleana (oha wai).

Hawaii F, G, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Clermontia pyrularia* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Montane wet *Metrosideros-Cibotium* forest containing one or more of the following associated native plant species: *Clermontia hawaiiensis, Cheirodendron trigynum, Cyrtandra platyphylla, Cibotium menziesii, C. chamissoi, Ilex anomala, Sadleria* spp., or *Coprosma pubens,* and

(*2*) Elevations between 436 and 1,728 m (1,430 and 5,670 ft).

Family Campanulaceae: Clermontia pyrularia (oha wai).

Hawaii E, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Clermontia pyrularia* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Wet and mesic montane forest dominated by *Acacia koa* or *Metrosideros polymorpha,* and subalpine dry forest dominated by *M. polymorpha* containing one or more of the following associated native plant species: *Coprosma* sp., *Dryopteris wallichiana, Rubus hawaiensis,* or *Hedyotis* sp.; and

(*2*) Elevations between 1,628 and 2,061 m (5,340 to 6,760 ft).

Family Campanulaceae: Cyanea hamatiflora ssp. *carlsonii* (haha).

Hawaii S, T, U, X, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Cyanea hamatiflora* ssp. *carlsonii* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Mesic montane forest dominated by *Metrosideros polymorpha* or *Acacia koa* containing one or more of the following associated native plants species: *Myoporum sandwicense, Clermontia clermontioides, Coprosma* sp., *Ilex anomala, Hedyotis* sp., *Sophora chrysophylla, Cibotium* spp., *Dryopteris* sp., or *Athyrium* sp.; and

(*2*) Elevations between 1,350 to 1,783 m (4,430 to 5,850 ft).

Family Campanulaceae: Cyanea platyphylla (haha).

Hawaii F, G, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Cyanea platyphylla* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha-Acacia koa* lowland and montane wet forests containing one or more of the following associated native plant species: *Coprosma* sp., *Psychotria hawaiiensis, Perrottetia sandwicensis, Scaevola* spp., *Cibotium* sp., *Antidesma platyphyllum, Clermontia* spp., *Hedyotis* sp., or *Cyrtandra* spp.; and

(*2*) Elevations between 120 and 915 m (390 and 3,000 ft).

Family Campanulaceae: Cyanea shipmanii (haha).

Hawaii F, G, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Cyanea shipmanii* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Montane mesic forest dominated by *Acacia koa-Metrosideros polymorpha* on the windward slopes of the island containing one or more of the following associated native plant species: *Ilex anomala, Myrsine lessertiana,* or *Cheirodendron trigynum;* and

(*2*) Elevations between 1,619 and 2,027 m (5,310 and 6,650 ft).

Family Campanulaceae: Cyanea stictophylla (haha).

Hawaii G, K, S, T, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Cyanea stictophylla* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Acacia koa* or wet *Metrosideros polymorpha* forests containing one or more of the following associated native plant species: *Melicope* spp., *Cibotium* sp., or *Urera glabra;* and

(*2*) Between elevations of 1,183 and 1,942 m (3,880 and 6,370 ft).

Family Campanulaceae: Delissea undulata (NCN).

Hawaii W, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Delissea undulata* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Dry cinder cones and open *Sophora chrysophylla* and *Metrosideros polymorpha* forest containing one or more of the following associated native plant species: *Diospyros sandwicensis, Dodonaea viscosa, Psychotria mariniana, P. greenwelliae, Santalum*

paniculatum, Sophora chrysophylla, Nothocestrum breviflorum, or *Acacia koa,* and

(*2*) Elevations between 890 to 1,747 m (2,920 to 5,730 ft).

Family Caryophyllaceae: Silene hawaiiensis (NCN).

Hawaii H, AA, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Silene hawaiiensis* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) In weathered lava, but also on variously aged lava flows and cinder substrates in montane and subalpine dry shrubland and containing one or more of the following associated native plants species: *Metrosideros polymorpha, Sophora chrysophylla, Vaccinium reticulatum, Styphelia tameiameiae, Rumex giganteus,* or *Dodonaea viscosa;* and

(*2*) Elevations between 896 and 3,011 m (2,940 and 9,880 ft).

Family Caryophyllaceae: Silene lanceolata (NCN).

Hawaii AA, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Silene lanceolata* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Rocky tumuli or outcrops, on aa lava, in deep ash deposits over pahoehoe lava and in Mauna Kea substrate in dry montane shrubland containing one or more of the following associated native plant species: *Eragrostis* sp., *Metrosideros polymorpha, Chamaesyce* sp., *Myoporum sandwicense, Sophora chrysophylla, Chenopodium oahuense, Dodonaea viscosa, Styphelia tameiameiae,* or *Dubautia linearis,* and

(*2*) Elevations between 1,253 and 1,320 m (4,110 and 4,330 ft).

Family Convolvulaceae: Bonamia menziesii (NCN).

Hawaii Z, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Bonamia menziesii* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Dry forest containing one or more of the following associated native plant species: *Diospyros sandwicensis, Erythrina sandwicensis, Xylosma hawaiiense, Myrsine lanaiensis, Metrosideros polymorpha, Santalum paniculatum, Sapindus saponaria, Pouteria sandwicensis, Nototrichium sandwicense, Chenopodium oahuense, Senna gaudichaudii, Sophora chrysophylla, Sida fallax, Osteomeles anthyllidifolia, Dodonaea viscosa, Canavalia hawaiiensis, Argemone glauca, Peperomia blanda* var. *floribunda,* or *Psilotum nudum,* and

(*2*) Elevations between 421 and 704 m (1,380 and 2,310 ft).

Family Cucurbitaceae: Sicyos alba (anunu).

Hawaii G, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Sicyos alba* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha-Cibotium glaucum* dominated montane wet forests, containing one or more of the following associated native plant species: *Coprosma* sp., *Astelia menziesii., Athyrium* sp., *Psychotria* sp., *Cheirodendron trigynum, Pritchardia beccariana, Platydesma spathulata, Broussaisia arguta, Cyrtandra lysiosepala, Stenogyne* sp., *Perrottetia sandwicensis, Cheirodendron trigynum, Cyanea tritomantha,* or *Athyrium microphyllum* and other ferns; and

(*2*) Elevations between 896 and 1,576 m (2,940 and 5,170 ft).

Family Cyperaceae: Mariscus fauriei (NCN).

Hawaii O, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Mariscus fauriei* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Diospyros sandwicensis-Metrosideros polymorpha-Sapindus saponaria* dominated lowland dry forests, often on a lava substrate containing one or more of the following associated native plant species: *Sophora chrysophylla, Myoporum sandwicense, Psydrax odorata, Peperomia blanda* var. *floribunda, Osteomeles anthyllidifolia,* or *Rauvolfia sandwicensis,* and

(*2*) Elevations between 107 and 402 m (350 and 1,320 ft).

Family Euphorbiaceae: Flueggea neowawraea (mehamehame).

Hawaii Q, R, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Flueggea neowawraea* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Mesic *Metrosideros polymorpha* forest containing one or more of the following associated native plant species: *Nestegis sandwicensis, Psychotria hawaiiensis, Pittosporum hosmeri, Pipturus albidus, Pisonia* spp., *Diospyros sandwicensis, Psydrax odorata, Antidesma platyphyllum,* A. *pulvinatum,* or *Nephrolepis* spp., and

(*2*) Elevations between 424 to 820 m (1,390 to 2,690 ft).

Family Fabaceae: Sesbania tomentosa (ohai).

Hawaii C, L, N, BB, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Sesbania tomentosa* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Open, dry *Metrosideros polymorpha* forest with mixed native grasses, *Scaevola sericea* coastal dry shrubland on windswept slopes, and weathered basaltic slopes containing one or more of the following associated native plant species: *Sporobolus virginicus, Styphelia tameiameiae, Wollastonia integrifolia, Jacquemontia sandwicensis, Sida fallax, Ipomoea pes-caprae, Dodonaea viscosa, Fimbristylis hawaiiensis, Myoporum sandwicense,* or *Waltheria indica,* and

(*2*) Elevations between sea level and 954 m (0 and 3,130 ft).

Family Fabaceae: Vigna o-wahuensis (NCN).

Hawaii D, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Vigna o-wahuensis* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Dodonaea viscosa* lowland dry shrubland containing one or more of the following associated native plant species: *Chenopodium oahuense, Dodonaea viscosa, Osteomeles anthyllidifolia, Wikstroemia* sp., or *Sida fallax;* and

(*2*) Elevations between 351 and 2,274 m (1,150 to 7,460 ft).

Family Gesneriaceae: Cyrtandra giffardii (haiwale).

Hawaii F, G, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Cyrtandra giffardii* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Wet montane forest dominated by *Cibotium* sp. or *Metrosideros polymorpha* and *Metrosideros polymorpha-Acacia koa* lowland wet forests containing one or more of the following associated native plant species: *Hedyotis terminalis, Astelia menziesiana, Diplazium sandwicensis, Perrottetia sandwicensis,* or other species of *Cyrtandra;* and

(*2*) Between elevations of 637 and 1,676 m (2,090 and 5,500 ft).

Family Gesneriaceae: Cyrtandra tintinnabula (haiwale).

Hawaii F, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Cyrtandra tintinnabula* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Lowland wet forest dominated by *dense Acacia koa*, *Metrosideros polymorpha*, and *Cibotium* spp. containing one or more of the following associated native plant species: *Cyrtandra* spp. or *Hedyotis* spp.; and

(*2*) Between elevations 390 and 1,430 m (1,280 and 4,690 ft).

Family Lamiaceae: Phyllostegia racemosa (NCN).

Hawaii E, F, G, H, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Phyllostegia racemosa* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Epiphytic conditions in *Acacia koa*, *Metrosideros polymorpha*, and *Cibotium* sp. dominated montane mesic or wet forests containing one or more of the following associated native plant species: *Vaccinium calycinum*, *Rubus hawaiiensis*, or *Dryopteris wallichiana*; and

(*2*) Elevations between 1,369 and 1,966 m (4,490 to 6,450 ft).

Family Lamiaceae: Phyllostegia velutina (NCN).

Hawaii G, K, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Phyllostegia velutina* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha-Acacia koa* dominated montane mesic and wet forests containing one or more of the following native plant species: *Cibotium* spp., *Cheirodendron trigynum*, *Vaccinium calycinum*, *Coprosma* sp., *Dryopteris wallichiana*, *Rubus hawaiiensis*, *Pipturus albidus*, *Athyrium microphyllum* and other native wet forest terrestrial ferns, *Myrsine lessertiana*, or *Ilex anomala*; and

(*2*) Elevations between 908 and 1,887 m (2,980 and 6,190 ft).

Family Lamiaceae: Phyllostegia warshaueri (NCN).

Hawaii B, F, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Phyllostegia warshaueri* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha* and *Cibotium* montane and lowland wet forest in which *Acacia koa* or *Cheirodendron trigynum* may co-dominate, containing one or more of the following associated native plant species: *Antidesma platyphyllum*, *Psychotria hawaiiensis*, *Hedyotis* sp., *Coprosma* sp., *Sadleria pallida*, *Broussaisia arguta*, *Pipturus albidus*, *Clermontia parviflora*, *Athyrium sandwicensis*, *Machaerina angustifolia*, *Cyanea pilosa*, or other *Cyanea* spp.; and

(*2*) Elevations between 730 and 1,150 m (2,400 and 3,770 ft).

Family Liliaceae: Pleomele hawaiiensis (hala pepe).

Hawaii A, L, P, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Pleomele hawaiiensis* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Open aa lava in diverse lowland dry forests and *Metrosideros-Diospyros* lowland dry forest containing one or more of the following associated native plant species: *Metrosideros polymorpha*, *Reynoldsia sandwicensis*, *Dodonaea viscosa*, *Diospyros sandwicensis*, *Sophora chrysophylla*, *Psydrax odorata*, *Cocculus trilobus*, *Myoporum sandwicense*, *Nestegis sandwicensis*, *Bobea timonioides*, *Kokia drynarioides*, *Nototrichium sandwicense*, *Sida fallax*, *Erythrina sandwicensis*, *Santalum paniculatum*, *Osteomeles anthyllidifolia*, *Caesalpinia kavaiensis*, *Colubrina oppositifolia*, *Nothocestrum breviflorum*, *Neraudia ovata*, or *Bidens micrantha* ssp. *ctenophylla;* and

(*2*) Elevations between 152 and 969 m (500 and 3,180 ft).

Family Malvaceae: Hibiscadelphus giffardianus (hau kuahiwi).

Hawaii I, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Hibiscadelphus giffardianus* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Mixed montane mesic forest containing one or more of the following native plant species: *Metrosideros polymorpha*, *Acacia koa*, *Sapindus saponaria*, *Coprosma rhynchocarpa*, *Pipturus albidus*, *Psychotria* sp., *Nestegis sandwicensis*, *Melicope* spp., *Dodonaea viscosa*, or *Myoporum sandwicense*; and

(*2*) Elevations between 1,192 and 1,277 m (3,910 and 4,190 ft).

Family Malvaceae: Hibiscadelphus hualalaiensis (hau kuahiwi).

Hawaii Z, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Hibiscadelphus hualalaiensis* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat and the habitat components provided by:

(*1*) Dry mesic to dry *Metrosideros* forest on rocky substrate in deep soils containing one or more of the following native plants species: *Metrosideros polymorpha, Acacia koa, Sapindus saponaria, Coprosma rhynchocarpa, Pipturus albidus, Psychotria* sp., *Nestegis sandwicensis, Melicope* spp., *Dodonaea viscosa,* or *Myoporum sandwicense;* and

(*2*) Between elevations 509 and 1,241 m (1,670 and 4,070 ft).

Family Malvaceae: Hibiscus brackenridgei (mao hau hele)

Hawaii Z, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Hibiscus brackenridgei* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Acacia koa* lowland mesic forest between containing one or more of the following native plants species: *Sida fallax* or *Reynoldsia sandwicensis,* and

(*2*) Elevations between 457 and 793 (1,500 and 2,600 ft).

Family Plantaginaceae: Plantago hawaiensis (laukahi kuahiwi)

Hawaii G, H, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Plantago hawaiensis* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Either montane wet sedge land (often in damp cracks of pahoehoe lava) with mixed sedges and grasses, montane mesic forest, dry subalpine woodland, or *Metrosideros polymorpha* and native shrub, containing one or more of the following associated native plant species: stunted *Acacia koa* and *Metrosideros polymorpha, Styphelia tameiameiae, Vaccinium reticulatum, Dodonaea viscosa, Coprosma montana,* or *Coprosma ernodeoides;* and

(*2*) Elevations between 1,512 and 2,585 m (4,960 and 8,480 ft).

Family Poaceae: Ischaemum byrone (Hilo ischaemum)

Hawaii M, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Ischaemum byrone* on Hawaii. Within this unit, the currently known primary

constituent elements of critical habitat are the habitat components provided by:

(*1*) Coastal wet to dry shrubland, near the ocean, rocks or pahoehoe lava in cracks and holes containing one or more of the following associated native plant species: *Scaevola sericea* or *Fimbristylis cymosa,* and

(*2*) Elevations between sea level and 137 m (0 and 460 ft).

Family Portulacaceae: Portulaca sclerocarpa (poe).

Hawaii D, L, AA, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Portulaca sclerocarpa* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Weathered Mauna Kea soils, cinder cones, or geologically young lavas, in montane dry shrubland, often on bare cinder, near steam vents, or in open *Metrosideros polymorpha* dominated woodlands containing one or more of the following associated native plant species: *Sophora chrysophylla, Wollastonia venosa,* or *Dodonaea viscosa,* and

(*2*) Elevations between 351 and 2,274 m (1,150 to 7,460 ft).

Family Rhamnaceae: Colubrina oppositifolia (kauila).

Hawaii Q, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Colubrina oppositifolia* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Lowland dry and mesic forests dominated by *Diospyros sandwicensis* or *Metrosideros polymorpha,* containing one or more of the following associated native plant species: *Nototrichium sandwicense, Nothocestrum breviflorum, Bobea timoniodes, Rauvolfia sandwicensis, Erythrina sandwicensis, Sophora chrysophylla, Nestegis sandwicensis, Peperomia* sp., *Psydrax odorata, Reynoldsia sandwicensis, Pleomele hawaiiensis,* or *Styphelia tameiameiae;* and

(*2*) Elevations between 162 and 945 m (530 and 3,100 ft).

Family Rhamnaceae: Gouania vitifolia (NCN).

Hawaii Q, identified in the legal description in paragraph (a)(1)(i)(H) constitutes critical habitat for *Gouania vitifolia* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Dry, rocky ridges and slopes in dry shrubland or dry to mesic *Nestegis-Metrosideros* forests on old substrate kipuka containing one or more of the following associated native plant species: *Nestegis sandwicensis, Wikstroemia sandwicensis, Wikstroemia phillyreifolia, Nephrolepis* spp., or *Pipturus albidus,* and

(*2*) Elevations between 503 and 1,039 m (1,650 and 3,410 ft).

Family Rubiaceae: Hedyotis coriacea (kioele).

Hawaii AA, identified in the legal description in paragraph (a)(1)(i)(H) constitutes critical habitat for *Hedyotis coriacea* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Geologically young (<3,000 years old) Mauna Loa pahoehoe lava with sparse *Metrosideros* forest, open *Metrosideros* forest with sparse shrub understory or open *Metrosideros* forest with dense shrub understory containing one or more of the following native plant species: *Sophora chrysophylla, Myoporum sandwicense, Dodonaea viscosa, Chenopodium oahuense, Styphelia tameiameiae, Eragrostis deflexa, Festuca hawaiiensis,* or *Portulaca sclerocarpa;* and

(*2*) Elevations between 1,506 to 1,780 m (4,940 to 5,840 ft).

Family Rubiaceae: Melicope zahlbruckneri (alani).

Hawaii I, K, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Melicope zahlbruckneri* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Acacia koa-Metrosideros polymorpha* dominated montane mesic forest containing one of more of the following associated native plant species: *Sapindus saponaria, Coprosma rhynchocarpa, Zanthoxylum dipetalum, Pipturus albidus, Psychotria hawaiiensis, Nestegis sandwicensis, Myoporum sandwicense, Pisonia brunoniana,* or *Melicope* spp.; and

(*2*) Elevations between 692 and 1,393 m (2,270 and 4,570 ft).

Family Rutaceae: Zanthoxylum dipetalum var. *tomentosum* (ae).

Hawaii Z, identified in the legal description in paragraph (a)(1)(i)(M) constitutes critical habitat for *Zanthoxylum dipetalum* var. *tomentosum* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha* dominated montane mesic forest, often on aa lava, containing one or more of the following associated native plant species: *Sophora chrysophylla, Diospyros sandwicensis, Pouteria sandwicensis, Santalum paniculatum, Reynoldsia sandwicensis, Myrsine* sp., or *Psychotria* sp.; and

(*2*) Elevations between 872 and 1,210 m (2,860 and 3,970 ft).

Family Rutaceae: Zanthoxylum hawaiiense (ae).

Hawaii AA, identified in the legal description in paragraph (a)(1)(i)(H) constitutes critical habitat for *Zanthoxylum hawaiiense* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha* dry forest or in open *Myoporum-Dodonaea* shrubland on rough aa lava containing one or more of the following associated native plant species: *Dodonaea viscosa, Myoporum sandwicense,* or *Dubautia linearis;* and

(*2*) Elevations between 1,204 and 1,756 m (3,950 and 5,760 ft).

Family Solanaceae: Nothocestrum breviflorum (aiea).

Hawaii A, V, Z, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Nothocestrum breviflorum* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Lowland dry forest, montane dry forest, or montane mesic forest dominated by *Metrosideros polymorpha, Acacia koa,* or *Diospyros sandwicensis* on aa lava substrates containing one or more of the following associated native plant species: *Sophora chrysophylla, Reynoldsia sandwicensis, Psydrax odorata, Myoporum sandwicense, Bidens micrantha, Dodonaea viscosa, Osteomeles anthyllidifolia, Santalum paniculatum, S. ellipticum, Caesalpinia kavaiensis, Erythrina sandwicensis, Colubrina oppositifolia, Kokia drynarioides, Hibiscadelphus hualalaiensis,* or *Delissea undulata;* and

(*2*) Elevations between 152 and 1,948 m (500 and 6,390 ft).

Family Solanaceae: Solanum incompletum (popolo ku mai).

Hawaii W, AA, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Solanum incompletum* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Dry to mesic forest, diverse mesic forest, or subalpine forest containing one or more of the following associated native plant species: *Myoporum sandwicense, Myrsine lanaiensis,* or *Sophora chrysophylla;* and

(*2*) Elevations between 1,192 and 2,259 m (3,910 and 7,410 ft).

Family Urticaceae: Neraudia ovata (NCN).

Hawaii Q, Y, AA, identified in the legal descriptions in paragraph (a)(1)(i)(H) , constitute critical habitat for *Neraudia ovata* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Open *Metrosideros polymorpha-Sophora chrysophylla* dominated lowland, montane dry forests, or *Metrosideros*-shrub woodland containing one or more of the following associated native plant species: *Reynoldsia sandwicensis, Myoporum sandwicense, Cocculus triloba, Myrsine lessertiana, Myrsine lanaiensis, Nothocestrum breviflorum, Pleomele hawaiiensis, Capparis sandwichiana, Fimbristylis hawaiiensis,* or *Bidens micrantha* ssp. *ctenophylla;* and

(*2*) Elevations between 115 and 1,829 m (380 to 6,000 ft).

Family Violaceae: Isodendrion hosakae (aupaka).

Hawaii D, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Isodendrion hosakae* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Cinder cones with montane dry shrubland containing one or more of the following associated native plant species: *Dodonaea viscosa, Styphelia tameiameiae, Wikstroemia pulcherrima, Dubautia linearis, Sophora chrysophylla, Osteomeles anthyllidifolia, Wollastonia venosa, Bidens menziesii,* or *Santalum ellipticum;* and

(*2*) Between elevations 655 and 1,259 m (2,150 and 4,130 ft).

Family Violaceae: Isodendrion pyrifolium (wahine noho kula).

Hawaii Y, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Isodendrion pyrifolium* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Lowland dry forests containing one or more of the following native plant species: *Psydrax odorata, Sida fallax, Myoporum sandwicense, Sophora chrysophylla,* or *Waltheria indica;* and

(*2*) Elevations between 18 to 137 m (60 to 450 ft).

(B) Ferns and Allies.

Family Aspleniaceae: Asplenium fragile var. *insulare* (NCN)

Hawaii G, K, AA, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Asplenium fragile* var. *insulare* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha* dry montane forest, *Dodonaea viscosa* dry montane shrubland, *Myoporum sandwicense-Sophora chrysophylla* dry montane forest, *Metrosideros polymorpha-Acacia koa* forest, or subalpine dry forest and shrubland with big, moist lava tubes (from 3.05 m to 4.57 m (10 to 15 ft) in diameter), pits, deep cracks, and lava tree molds, with at least a moderate soil or ash accumulation or, infrequently, the interface between younger aa lava flows and much older pahoehoe lava or ash deposits, with a fairly consistent microhabitat (areas that are moist and dark), and containing one or more of the following associated native plant species: *Phyllosteia ambigua, Styphelia tameiameiae, Vaccinium reticulatum,* mosses, or liverworts; and

(*2*) Elevations between 930 and 2,710 m (3,050 and 8,890 ft).

Family Aspleniaceae: Diellia erecta (NCN)

Hawaii Q, R, identified in the legal descriptions in paragraph (a)(1)(i)(H), constitute critical habitat for *Diellia erecta* on Hawaii. Within these units, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) *Metrosideros polymorpha-Nestegis sandwicensis* lowland mesic forest containing one or more of the following associated native plant species: *Diospyros sandwicensis, Psydrax odorata, Antidesma platyphyllum, A. pulvinatum, Microlepia* sp., *Nestegis sandwicensis, Wikstroemia sandwicensis, Wikstroemia phillyreifolia,* or *Nephrolepis* spp.; and

(*2*) Elevations between 448 and 982 m (1,470 and 3,220 ft).

Family Grammitidaceae: Adenophorus periens (pendant kihi fern)

Hawaii J, identified in the legal description in paragraph (a)(1)(i)(H), constitutes critical habitat for *Adenophorus periens* on Hawaii. Within this unit, the currently known primary constituent elements of critical habitat are the habitat components provided by:

(*1*) Epiphytic on *Metrosideros polymorpha* or *Ilex anomala* or possibly other native tree trunks, in *Metrosideros polymorpha-Cibotium glaucum* lowland wet forest containing one or more of the following associated native plant species: *Broussasia arguta, Cheirodendron trigynum, Cyanea* sp., *Cyrtandra* sp., *Dicranopteris linnearis, Freycinetia arborea, Hedyotis terminalis, Labordia hirtella, Machaerina angustifolia, Psychotria* sp., or *Psychotria hawaiiensis;* and

(*2*) Elevations between 338 and 1,180 m (1,110 and 3,870 ft).

Dated: May 2, 2002.

Craig Manson,

Assistant Secretary for Fish and Wildlife and Parks.

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